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A COMPARISON OF NUTRIENT INTAKES  
BETWEEN A FT. RILEY  
CONTRACTOR-OPERATED AND A  
FT. LEWIS MILITARY-OPERATED  
GARRISON DINING FACILITY

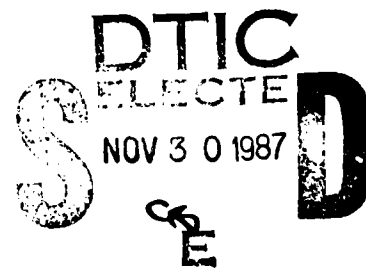
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intakes of the test subjects consuming meals at the Ft. Riley and Ft. Lewis dining facilities were remarkably similar. Nutrient intakes met the MRDA for energy, protein, vitamins, and minerals. Nutrition initiatives intended to lower fat intakes, i.e., low fat milk, decreasing fat added in cooking, and using trimmed meats, appeared to be working. At the Ft. Riley and Ft. Lewis dining facilities, fat intakes of the test subjects comprised 37.5% and 37.4% of total calories respectively, values below previous findings (42%) but still exceeding the target level of 35% (maximum) of total calories. Average daily cholesterol intakes of 761 mg and 748 mg per day respectively, exceeded the level recommended by the American Heart Association and others. OTSG has not made a quantifiable cholesterol recommendation for healthy soldiers. Forty-two percent of total daily cholesterol was provided by eggs consumed by the Ft. Riley test subjects, versus 44% of the total daily cholesterol consumed by the Ft. Lewis test subjects. Sodium intakes for the Ft. Riley test subjects were slightly higher, 1821 mg per 1000 calories, compared to 1532 mg sodium per 1000 calories for the Ft. Lewis test subjects. The OTSG recommendation is 1400-1700 mg per 1000 calories. Approximately 10% of the total sodium was obtained from salt added by the test subjects.

Nutrition initiatives designed to decrease fat intake to the target level of 35%, should be expanded and evaluated. The feasibility and effectiveness of using low cholesterol, low fat alternatives to eggs to moderate cholesterol and fat intakes should also be evaluated. Efforts directed to reduce the sodium content of the Tri-Service Recipe File, TM 10-410, should be continued and evaluated prior to implementation. Soldiers eating habits outside of military dining facilities should be assessed. Nutrition initiatives designed to provide nutrition education to soldiers in Basic Training and in other training should be continued to insure soldiers receive a block of standardized nutrition education every year throughout their military careers.

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GARRISON DINING FACILITY

EILEEN G. SZETO, CPT, SP  
DAWN E. CARLSON, MAJ, SP  
THOMAS B. DUGAN  
JOAN C. BUCHBINDER, M.S., R.D.

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U.S. ARMY RESEARCH INSTITUTE OF ENVIRONMENTAL MEDICINE

Natick, MA 01760-5007

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## ABSTRACT

The Office of the Deputy Chief of Staff for Logistics (ODCSLOG) has tasked the U.S. Army Research Institute of Environmental Medicine (USARIEM) to complete a series of nutrition assessments of soldiers subsisting in military dining facilities to evaluate the impact of nutrition initiatives planned to moderate soldiers' sodium, fat and cholesterol intakes and provide soldiers low calorie menu selections. In July-August 1986, the first nutrition assessment was completed on 43 male Primary Leadership Development Course students consuming meals in the contractor-operated NCO Academy Dining Facility, Ft. Riley, Kansas. During November 1986, the second 7-day nutrition assessment was completed on 31 male soldiers from Ft. Lewis, Washington, consuming meals in the military-operated 80th Ordnance Battalion dining facility. Nutrient intakes were assessed by comparing average daily nutrient intakes, expressed as group means, with the Office of the Surgeon General (OTSG) Military Recommended Dietary Allowances (MRDA).

Despite differences in the test facilities and test populations studied, nutrient intakes of the test subjects consuming meals at the Ft. Riley and Ft. Lewis dining facilities were remarkably similar. Nutrient intakes met the MRDA for energy, protein, vitamins, and minerals. Nutrition initiatives intended to lower fat intake, i.e., low fat milk, decreasing fat added in cooking, and using trimmed meats, appeared to be working. At the Ft. Riley and Ft. Lewis dining facilities, fat intakes of the test subjects comprised 37.5% and 37.4% of total calories respectively, values below previous findings (42%) but still exceeding the target level of 35% (maximum) of total calories. Average daily cholesterol intakes of 761 mg and 748 mg per day respectively, exceeded the level recommended by the American Heart Association and others. OTSG has not made a quantifiable cholesterol intake recommendation for healthy soldiers. Forty-two percent of total daily cholesterol was provided by eggs consumed by the Ft. Riley test subjects, versus 44% of the total daily cholesterol

consumed by the Ft. Lewis test subjects. Sodium intakes for the Ft. Riley test subjects were slightly higher, 1821 mg per 1000 calories, compared to 1532 mg sodium per 1000 calories for the Ft. Lewis test subjects. The OTSG recommendation is 1400-1700 mg sodium per 1000 calories. Approximately 10% of the total sodium was obtained from salt added by the test subjects.

Nutrition initiatives designed to decrease fat intake to the target level of 35% should be continued, expanded and evaluated. The feasibility and effectiveness of using low cholesterol, low fat alternatives to eggs to moderate cholesterol and fat intakes should also be evaluated. Efforts directed to reduce the sodium content of the Tri-Service Recipe File, TM 10-410, should be continued and evaluated prior to implementation. Soldiers eating habits outside of military dining facilities should be assessed. Nutrition initiatives designed to provide nutrition education to soldiers in Basic Training and in other training should be continued to insure soldiers receive a block of standardized nutrition education every year throughout their military careers.

## INTRODUCTION

### Background and Military Relevance

In response to a tasking by the Vice Chief of Staff of the Army, initiatives designed to heighten soldiers' awareness of the importance of nutrition, to educate soldiers to make appropriate food choices, and to provide a variety of nutritious menu alternatives to soldiers have been implemented in garrison dining facilities. During October 1985, a need to evaluate the effectiveness of the nutrition initiatives that have been implemented in Army Dining Facilities was identified by the participants of the ODCSLOG sponsored MACOM Worldwide Nutrition Conference.

ODCSLOG tasked Medical Research and Development Command, specifically Military Nutrition Division, USARIEM, to conduct a series of evaluations, and tasked U.S. Army Forces Command (FORSCOM) and U.S. Army Training and Doctrine Command (TRADOC) to provide the test units (1). Military Nutrition Division requested participation from Behavioral Sciences Division, Science and Advanced Technology Directorate, U.S. Army Natick Research, Development and Engineering Center (NRDEC), located in Natick, Massachusetts, to assess nutrition awareness and attitudes of soldiers and food service personnel.

In July-August 1986, the Ft. Riley study was completed at the contractor-operated NCO Academy Dining Facility. In November 1986, the Ft. Lewis study was completed at the military-operated 80th Ordnance Battalion Dining Facility. The results of the Ft. Riley dining facility study are published in a separate USARIEM technical report (1). This report will compare the results of these two dining facility studies. Contracting Army Dining Facility operations is becoming more prevalent, consequently ODCSLOG is particularly interested in determining if contractor-operated dining facilities are meeting the nutritional requirements of soldiers subsisting in these facilities.

## Objectives and Approach

Objectives of the Ft. Riley and Ft. Lewis dining facility studies were:

- (1) To evaluate the nutritional adequacy of meals consumed by soldiers eating in garrison dining facilities.
- (2) To evaluate whether the nutrition initiatives implemented in military dining facilities were working to moderate soldiers' sodium, fat and cholesterol intakes, and provide soldiers low calorie menu selections.
- (3) To assess the impact of the Army's nutrition initiatives on the awareness, perceptions, attitudes, behaviors, and knowledge of soldiers eating in military dining facilities.

USARIEM's Military Nutrition Division was responsible for the first and second objectives. Food intake data was collected by trained data collectors who utilized a modified visual estimation method (1,2,3). Nutrient intakes of the test subjects, expressed as group means, were compared with the MRDA to determine whether soldiers met the MRDA standards (4). The Ft. Riley and Ft. Lewis Food Advisors supplied information documenting the implementation and status of the nutrition initiatives.

The Behavioral Sciences Division of NRDEC, addressed the third objective using questionnaires designed to assess nutrition knowledge, attitudes, and behaviors. The results of the questionnaire will be published as a separate NRDEC report.

## METHOD

### Test Facilities

The NCO Academy dining facility was selected by FORSCOM to serve as the test facility for the Ft. Riley study (1). The NCO Academy dining facility is a contractor-operated dining facility which feeds between 150-250 soldiers per meal. The Food Service Manager is required to meet the requirements of Army Regulation 30-1 (5) which include the implementation of the nutrition initiatives delineated in Appendix J of that regulation. The Food Service Manager was not required to use the Army Master Menu and chose not to do so. A copy of the menu used during the Ft. Riley study can be found in Appendix A.

The 80th Ordnance Battalion dining facility was selected to serve as the test facility for the Ft. Lewis study. The 80th Ordnance Battalion dining facility is a military-operated facility which feeds between 125-390 soldiers per meal. The Food Service Sergeant is required to meet the requirements of Army Regulation 30-1 including the implementation of the nutrition initiatives as delineated in Appendix J of that regulation. The Food Service Sergeant was required to use the Army Master Menu as a guide for menu planning and was doing so especially for the selection of main entrees. The Ft. Lewis dining facility was the "1986" winner of the I Corps Connelly Award for excellence in Army Food Service. A copy of the menu used during the Ft. Lewis study can be found in Appendix B.

### Nutrition Initiatives

The Ft. Riley and Ft. Lewis Food Advisors were asked to provide information regarding implementation and status of the nutrition initiatives in place during the time frame the studies occurred. Information provided in response to these requests are provided in Appendix C and D.

### Selection and Recruitment of Test Subjects

Soldiers who volunteered to participate in these studies attended a briefing on the purpose of the study. After being given an opportunity to ask questions, the volunteers signed a Volunteer Agreement in accordance with the approved Human Use protocol. Demographic questionnaires (Appendix E) which included information regarding usual eating habits were administered to the volunteers. Height and weight data and Army Physical Fitness Training (APFT) Test Card scores were obtained. All of the Ft. Riley test subjects and the majority of the Ft. Lewis test subjects were in compliance with AR 600-9 standards (6).

Attendance at meals at Ft. Riley was mandatory since the volunteers were attending the NCO Academy. The Ft. Riley test results are based on food intake data collected from 43 male NCO Academy cadets who attended three meals per day during the 7 days of the study. At Ft. Lewis attendance at meals was not mandatory therefore criteria were established to eliminate the data collected from volunteers who did not eat in the dining facility on a regular basis. Consequently, food intake in the dining facility did not in all cases, provide the total daily food intake. The Ft. Lewis test results discussed in this report are based on food intake data collected from 31 male subjects who ate in the dining facility on a fairly regular basis. Data collected from test subjects who did not eat at least one breakfast, lunch, or dinner meal was excluded. A mean of previously attended meals was used to calculate the average nutrient intakes for test subjects who missed meals. Data on food intake outside the dining facility was collected via 24-hour written recalls from the test subjects. The analysis of food intake outside of the dining facility is not included in this report.



### Food Intake Data

A portion of each food served at every meal was obtained and weighed. These weighed portions of foods were used as reference standards by the data collectors to visually estimate portions served to and portions left by the volunteers, estimating to the nearest 0.1 of a portion. This method was used and validated during the CFFS-FDTE and in subsequent USARIEM studies (1,2,3). Copies of the data collection forms used during the dining facility studies are in Appendix F. Test subjects used individual salt packets rather than using the shakers provided on the tables so the amount of salt added by the test subjects could be quantified.

Data collectors were trained to visually estimate portion sizes at USARIEM prior to the study. Data collectors practiced estimating portion sizes by comparing various portion sizes to a reference "standard" plate which contained a pre-weighed standard portion of each food item. Each plate contained fractional portions of the reference standard plate. The trainer provided feedback to the data collectors on how accurately they were estimating portion sizes. After estimating portions as served, data collectors estimated portions on trays arranged to represent leftover (unconsumed) food. Data collectors evaluated the same trays independently and their results were compared to the actual portion weights to determine accuracy.

Before actual data collection at Ft. Riley and Ft. Lewis, data collectors performed a practice run. The purpose of the practice run was to provide data collectors experience with foods served in the dining facility and practice estimating self-service items.

### Limitations

Direct chemical analyses were not performed to determine the nutrient composition of foods served during the two studies. Nutrient composition data for some foods is lacking or incomplete, e.g., data is not available on dietary fiber and data on folic acid is incomplete. Intakes of vitamin B<sub>6</sub>, folacin, magnesium, and zinc were not included since food composition data for these nutrients was incomplete and conclusions made could be misleading. Although there are MRDA for vitamin D, vitamin E, and iodine, lack of food composition data precluded evaluation of the adequacy of these nutrients. Baseline data was not collected prior to implementation of nutrition initiatives which limited the ability to fully evaluate the nutrition initiatives impact on soldiers' eating habits in garrison dining facilities.

### Nutrient Data Base

A nutrient data base was created for each of these studies by monitoring food preparation methods and recipes followed in both dining facilities. Standard recipes from TM 10-410, were used for developing the data base (7). Recipe information was obtained for food items prepared that were not part of the Tri-Service Recipe File. Observation during food preparation at each meal was used to record deviations in preparation from the standard recipe file. The actual amount of certain ingredients, with particular attention directed to sodium and fat sources, and food yields were measured for selected foods. Information was obtained on commercial products used and nutrient composition information was compiled for these items. The University of Massachusetts Nutrient Data Base was used to calculate the nutrient composition of recipe ingredients used during the study. Nutrient information was compiled to provide nutrient data on a per serving and per 100 gram basis.

## RESULTS

### Demographics

Tabulation of the answers supplied by the test subjects on the demographics questionnaire, revealed that the average Ft. Riley test subject was 25 years old, whereas the average Ft. Lewis test subject was 21 years old. Ft. Riley test subjects average length of time in the Army was 4.5 years, compared to one year, 10 months for the Ft. Lewis test subjects. Fifty-eight percent of the Ft. Riley test subjects were E-4s and forty-two percent were E-5s, whereas at Ft. Lewis, forty-three percent of the population were E-3s and thirty-three were E-4s, twenty percent were E-2s, and three percent were E-1s. The distribution by racial category at Ft. Riley was: 74% White, 19% Black, 5% Other and 2% Hispanic. At Ft. Lewis the racial distribution was: 60% White, 26% Black, 10% Other and 3% Hispanic.

### Nutrient Intake

The method used to calculate the average daily nutrient intakes was identical for both studies. Average daily nutrient intakes were calculated by averaging individual data over each of the 7-day studies and comparing these averaged intakes with the Office of the Surgeon General Military Recommended Dietary Allowances (MRDA) provided in AR 40-25 (4). Comparison of nutrient intakes, expressed as a mean for each nutrient, with MRDA levels are presented in Table 1.

Based on food intake data collected in the dining facilities, the Ft. Riley and Ft. Lewis test subjects energy intakes were 3112 Kcal per day and 3173 kcal per day respectively, and were within the 2800-3600 kcal per day MRDA range for moderately active males. The average caloric intake from snacks was calculated for both groups of test subjects. At Ft. Riley, snacks were estimated to have provided an additional 80 kcal per day and thus raised total daily intakes to approximately 3192 kcal per day. Ft. Lewis test subjects frequently chose not eat in the dining facility. Data

was collected on foods consumed outside of the dining facility but the analysis of that data is not included in this report. The analysis of the Ft. Lewis snack data will be included in another USARIEM technical report.

Mean daily protein intakes of the test subjects at Ft. Riley and Ft. Lewis were,  $123 \pm 31.2$  grams and  $125 \pm 22.5$  grams respectively, which met the MRDA of 100 grams per day.

Fat intakes at Ft. Riley averaged  $130 \pm 43$  grams per day and  $132 \pm 32$  grams per day at Ft. Lewis. Fat consumed by the test subjects contributed 37.5% of the total calories at Ft. Riley and 37.4% of the total calories at Ft. Lewis. The MRDA for fat specifies that not more than 35% of total calories should be provided as fat. Fat intakes will be discussed in greater detail later in this report.

The MRDA for carbohydrate is also expressed as a percent of total calories. Although carbohydrate is not included in the table of nutrients with specific MRDA in AR 40-25, the text provides a guideline of 50-55% of total calories to be supplied by carbohydrate. Following this guideline, soldiers consuming 2800-3600 calories should consume 350-495 grams of carbohydrate per day. Average daily intakes of  $367.9 \pm 101$  grams at Ft. Riley and  $378.1 \pm 83$  grams at Ft. Lewis met the MRDA guidelines.

Vitamin and mineral intakes, including sodium at Ft. Lewis but not at Ft. Riley, met the MRDA guidelines. Figures 1 and 2 provide a comparison of vitamin and mineral intakes of the Ft. Riley and Ft. Lewis test subjects. Sodium intake is not included on the graph of mineral intakes, as it will be discussed separately in more detail.

## DISCUSSION

### Assessment of Nutrient Intakes

Based on group mean comparison with MRDA for selected nutrients, the meals these male soldiers consumed in the Ft. Riley and Ft. Lewis dining facilities were nutritionally adequate. The test subjects consumed greater than 100% of the MRDA for protein, vitamins and minerals evaluated. Therefore, use of a vitamin and or mineral supplement for male soldiers eating regularly in these dining facilities is not indicated. Since soldiers are not required to eat their meals in Army dining facilities, their nutritional status is influenced by the choices they make when they eat in other places. Whether soldiers eating meals from a variety of sources, i.e., home, restaurants and fast food outlets, would meet nutritional requirements cannot be determined from the data collected. Whether female soldiers eating regularly from the same menus, but predictably consuming fewer calories, would also meet all vitamin and or mineral recommendations cannot be answered from these studies, therefore these issues will have to be addressed in future studies.

### Evaluation of Selected Nutrition Initiatives

Nutrition initiatives have been implemented to decrease soldiers' sodium, fat, and cholesterol intakes, and to provide soldiers lower calorie menu selections. Food intake data was used to assess the effectiveness of the nutrition initiatives, however data was not collected prior to implementation of the nutrition initiatives which makes it difficult to fully assess the impact of the nutrition initiatives.

## Sodium

A 25% reduction in the amount of salt used in recipes was one of the first nutrition initiatives implemented. Initially ODCSLOG/OTSG distributed a message to decrease salt in recipes by 25%. Cooks were instructed to calculate a 25% salt reduction and adjust certain recipes as they were prepared. The recipes used during the Ft. Riley study were the Change 1 version of TM 10-412. The change 0 version of TM 10-412 was used at Ft. Lewis, which does not include a 25% salt reduction. The Ft. Lewis cooks claimed that the recipe cards of the Change 1 version of TM 10-412 which includes the 25% salt reduction were lost. Monitoring of food preparation methods demonstrated that in general the cooks were following the guidelines to reduce salt; however, the amount of salt individual cooks used varied from cook to cook. Some cooks, particularly the Ft. Lewis cooks, were biased against salt and omitted it and other high sodium ingredients, e.g., gravy base. However, the Ft. Riley cooks added monosodium glutamate and the juices from canned vegetables which contain sodium, to compensate for the salt that has been reduced in the recipes. Food intake data calculations are based on actual food preparation techniques.

Daily sodium intakes averaged  $5668 \pm 1705$  milligrams at Ft. Riley and  $5020 \pm 1487$  milligrams at Ft. Lewis as presented in Figure 3. The amount of sodium contributed by food as served is represented by the solid portion of the bars. The amount of sodium contributed by salt added by the test subjects is represented by the cross-hatched areas. Salt added by the test subjects contributed approximately 11% of the total sodium at Ft. Riley and 9% of the total sodium intake at Ft. Lewis. The MRDA guideline for sodium intakes for garrison feeding has been established as a range of 1400-1700 milligrams sodium per 1000 Kcal. Daily sodium intakes averaged 1821 milligrams per 1000 Kcal at Ft. Riley which exceeded upper limit of the MRDA guidelines by 7%. Average sodium intakes at Ft. Lewis of 1584

milligrams per 1000 Kcal, were usually within the MRDA range. Figure 4 compares the average sodium intakes at Ft. Riley and Ft. Lewis per 1000 Kcal with the MRDA minimum and maximum levels represented by the horizontal broken lines. The amount of sodium the test subjects obtained from the food itself and the amount of sodium they obtained from the salt they added at the table is also depicted in Figure 4. Figure 5 compares average daily sodium intakes per 1000 Kcals for breakfast, lunch and dinner meals. The solid portion of the bars represent the amount of sodium test subjects obtained from food. The open portion of the bars, represent the amount of sodium contributed from the salt the test subjects added to their food at the table. The numbers in the solid portion of the bars, represent the number of test subjects who did not add salt to their food. The numbers in the open portion of the bars represent the number of test subjects who added salt to their food.

### Fat

Appendix J of AR 30-1 provides menu, preparation and serving standards designed to decrease soldiers' fat intakes, i.e., trimming excess fat from meat, offering non-fried entree alternatives, cooking vegetables without added fat and using 2% fat milk instead of whole milk as the primary bulk milk source. The MRDA for fat specifies that not more than 35% of total calories should be provided as fat. Fat consumed by the test subjects contributed 37.5% of the total calories at Ft. Riley and 37.4% of the total calories at Ft. Lewis. Figure 6 provides a comparison of average fat intakes at Ft. Riley and Ft. Lewis on a per meal basis. The solid portion of the bars represent breakfast fat intakes, the cross-hatched portion of the bars represent lunch fat intakes, and the horizontal lines represent dinner fat intakes. Figures 7A-C provide a comparison of the percentage of calories obtained from fat at each meal for Ft. Riley as represented by the open bars, and Ft. Lewis as represented by the cross-hatched bars.

Two percent low fat milk was used as the main source of milk during both studies. Two percent low fat chocolate milk was available at Ft. Riley and Ft. Lewis. Skim milk was not available at Ft. Riley. Skim milk was available each day at Ft. Lewis. Neither Ft. Riley nor Ft. Lewis served whole milk or buttermilk. To determine the impact of the low fat milk initiative, the amount of fat that would have been consumed if whole, 3.3% fat milk had been used was calculated, omitting chocolate milk consumption. These data are presented in Tables 2 and 3. An assumption was made that the total volume of milk consumed would not have changed. The data are presented for the 29 subjects who drank milk at Ft. Riley and all the Ft. Lewis test subjects since milk was consumed at least once by all of them. The average daily quantity of milk consumed by the Ft. Riley test subjects was 502 grams, approximately 2 cups. At Ft. Lewis the test subjects drank 307 grams, approximately one and one-quarter cups. The nutrition initiative to use 2% low fat milk instead of 3.3% fat whole milk has resulted in lowering the percentage of calories obtained from fat by approximately one percent. Low fat milk also contains less cholesterol than whole milk.

#### Cholesterol

Serving margarine instead of butter and serving alternatives to eggs at breakfast meals are examples of nutrition initiatives implemented to decrease soldiers' cholesterol intakes. Breakfast alternatives to egg entrees such as yogurt and cereals were available daily. Cereals were more popular at Ft. Lewis as they were eaten by 28% of the test subjects whereas at Ft. Riley they were eaten by 10% of test subjects. At Ft. Lewis, 16% of soldiers ate cereal in addition to eggs, and only 12% of soldiers ate cereal as a substitute for eggs. At Ft. Riley, 7% of the test subjects ate cereal in addition to eggs, and 3% ate cereal as a substitute for eggs.



Cholesterol intakes averaged  $761 \pm 296$  milligrams per day at Ft. Riley and  $744 \pm 219$  milligrams per day at Ft. Lewis. Since OTSG has not made a quantifiable recommendation for cholesterol intake of healthy soldiers, daily intakes cannot be evaluated by the method used for other nutrients, therefore descriptive data which highlights sources of cholesterol in the diet will be discussed.

Figure 8 provides a comparison of average daily cholesterol intakes on a per meal basis for Ft. Riley and Ft. Lewis test subjects. The solid portion of the bars represent breakfast cholesterol intakes, the cross-hatched portion of the bars represent lunch cholesterol intakes and the horizontal lines represent dinner cholesterol intakes. As shown in Figure 8, the breakfast meal supplied a greater amount of dietary cholesterol than did either the lunch or dinner meals. Eggs served at breakfast supplied the bulk of the cholesterol as illustrated by the stacked bar graph at Figure 9. The solid portion of the bars represent the amount of cholesterol contributed by eggs, the cross-hatched areas represent cholesterol from other sources, i.e., breakfast meats and pancakes, and the horizontal lines represent cholesterol provided by french toast. Figure 10 provides a comparison of average cholesterol intakes per 1000 Kcals. The American Heart Association recommendation for cholesterol intake is 100 milligrams per 1000 Kcals, not to exceed a total of 300 milligrams per day.

Egg entrees were popular, 95% of the test subjects at Ft. Riley and 88% of test subjects at Ft. Lewis selected eggs for breakfast. Providing low cholesterol, low fat alternatives to eggs, combined with nutrition education and an innovative marketing approach, may be successful in decreasing soldiers' cholesterol intakes. Another approach to decrease the amount of cholesterol soldiers obtain in garrison dining facilities would be to use commercially produced, cholesterol free egg substitutes in place of scrambled eggs and omelets. The potential impact of substituting cholesterol free egg substitutes for scrambled eggs is shown in Tables 4 and 5. Tables 4 and 5 represent the amount of cholesterol contributed by scrambled eggs based on food

intake data. If low cholesterol egg substitutes were used in place of scrambled eggs in the Ft. Riley and Ft. Lewis studies and consumption rates remained the same, cholesterol intakes would have been reduced by approximately 156-226 mg per day. However, the overall health goal and plan for reducing soldiers' cholesterol intakes needs careful consideration. If the goal is to provide less cholesterol in garrison dining facilities, using low cholesterol egg substitutes may be feasible. The impact of using low cholesterol eggs substitutes would need to be considered, i.e., acceptability, cost, practicality, procurement, etc. If the goal is to have soldiers eat less high cholesterol foods irregardless of where they eat, a nutrition education program is needed to motivate soldiers to select these foods.

## COMPARISON WITH OTHER NUTRITION STUDIES AND SURVEYS

### Military Nutrition Studies

Comparing data from the Ft. Riley and Ft. Lewis studies, with that from other recent military nutrition assessment studies demonstrates several similarities and some noteworthy differences in average daily nutrient intakes. Tables 6A-C provide a comparison of the Ft. Riley and Ft. Lewis studies with studies conducted at Ft. Sill (3) and Pohakuloa Training Area (PTA) (2) and at West Point (8). The West Point study was conducted in 1979 when emphasis on reducing fat intake was increasing. A food diary-interview methodology was used to evaluate intakes of male and female cadets attending the Academy. Visual estimation was used to collect food intake data at PTA, Ft. Sill, Ft. Riley, and Ft. Lewis. Although the Ft. Sill study involved 8-days of sustained field operations, a short-term moratorium on feeding the Meal, Ready-to-Eat (MRE), resulted in feeding the field artillery soldiers A-rations which are not usually used exclusively during field training exercises. The A-rations served were prepared by military cooks in a garrison dining facility and transported to the field. Nutrient intake data obtained from the 44-day CFFS-FDTE conducted at PTA are shown for division artillery soldiers consuming two A-rations and one MRE per day or 2 Tray Pack rations (T-rations) and one MRE per day.

Average intakes of energy, fat, cholesterol, and sodium from each study are shown in Tables 6A-C. The energy intakes of the test subjects at the Ft. Lewis dining facility (3173 Kcal) the Ft. Riley test subjects (3112 Kcal) and of artillery soldiers (3047 Kcal) eating two A-rations and one MRE during the CFFS-FDTE were similar and near the lower limits of the MRDA range for energy, 2800-3600 Kcal, for moderately active males. The lower energy intakes observed in the two T-ration and one MRE group (2689 Kcal per day) were due to decreased food intake at T-ration meals reflecting lower acceptability of some T-ration menu items. Energy intakes observed in the Ft. Sill study (3713 Kcal) were attributed to the higher energy

expenditures required for sustained artillery operations and the popularity of the A-rations served. The energy intakes of male West Point Cadets (3738 Kcal) were appropriate to meet the demands of their heavy physical training schedule.

The percentage of calories supplied by fat at Ft. Lewis was almost identical to those found at Ft. Riley, Ft. Sill and West Point where low fat milk was also served (1.3.8). The menus for the A-rations served during the CFFS-FDTE did not reflect the nutrition initiative menu modifications. Since baseline data was not collected prior to the implementation of the nutrition initiatives, the data collected for the A-ration menus used during the CFFS-FDTE provide an approximation of nutrient intakes prior to implementation of the nutrition initiatives. The A-rations served included whole milk, gravies with most meat entrees, butter instead of margarine and baked cookies and cakes as the primary desserts. The lower percentage of fat calories observed with the two T-rations and one MRE ration mix is due to the fact that T-rations contain less fat than other rations, and milk was not offered with the T-ration menus. These differences in ration composition and intake were evident with 42% of calories obtained from fat with the two A-rations and one MRE ration mix compared to only 31% calories obtained from fat with the two T-rations and one MRE ration mix.

The average daily cholesterol intakes observed at Ft. Riley, (760 milligrams per day) Ft. Lewis, (748 milligrams per day) Ft. Sill, (749 milligrams per day) and with the two A-rations and one MRE ration mix at PTA (770 milligrams per day) were primarily due to egg intake at the breakfast meal. In each of these studies fresh eggs were consumed by the majority of soldiers. A canned egg and ham product was available every day for the two T-rations and one MRE group, however, consumption rates were low. Consequently the two T-ration and one MRE group, had the lowest cholesterol intakes (294 milligrams per day). At West Point, eggs were served at some but not all breakfast meals and cholesterol intakes averaged 599 and 403

milligrams per day for male and female cadets, respectively.

Sodium intakes at Ft. Lewis were within MRDA guidelines, however sodium intakes at Ft. Riley, Ft. Sill, and PTA all exceeded the OTSG recommended range of 1400-1700 milligrams sodium per 1000 Kcal for garrison feeding. The lower levels at West Point cannot be compared with these levels as shown because the amount of salt used by the cooks and the cadets was not collected.

### Civilian Nutrition Surveys

Since Army personnel form a subset of the American population, data from the Ft. Riley and Ft. Lewis dining facility studies were compared with energy, fat and cholesterol intake levels for the United States civilian population. The United States Department of Agriculture (USDA) and Department of Health and Human Services (DHHS) conducts the National Nutrition Monitoring System which includes a data base for nutrients consumed by Americans plus selected health and nutritional status indicators (9). The dietary data used for this comparison was taken primarily from the USDA Nationwide Food Consumption Surveys (NFCS) and the health/nutritional status data from the DHHS National Health and Nutrition Examination Survey (NHANES). The dietary data for individuals was based on three days of food intake. Day one was obtained via 24-hour recall, days two and three were collected by food records. Data available for comparison were from the 1977-78 survey and the more recent 1985 Continuing Survey of Food Intakes by Individuals (CSFII), which used one day food intakes (10).

Data on average daily intakes of selected nutrients for males are provided in Table 7. The percentage of calories supplied by fat in the 1985 CSFII was 35.3% which is 2% lower than what was observed in the Ft. Riley and Ft. Lewis dining facility studies. In the 1977-78 NFCS, 42% percent of the calories were obtained from fat which is similar to what was found with the two A-rations and one MRE group during the CFFS-FDTE. Cholesterol intakes on a milligram per day basis were also higher at Ft. Riley and Ft. Lewis. The daily availability of fresh eggs probably contributed to this greater intake. The NFCS sodium value does not include salt added in cooking or salt added at the table. The sodium value provided represents the sodium found naturally in food.

## SUMMARY

A comparison of nutrient intakes in the contractor-operated NCO Academy dining facility at Ft. Riley, Kansas and the military-operated 80th Ordnance Battalion dining facility at Ft. Lewis, Washington has been completed. The major objectives of these studies were to assess the nutritional adequacy of meals consumed by soldiers eating in Army dining facilities, and evaluate whether ODCSLOG initiatives implemented in dining facilities are working to moderate sodium, fat and cholesterol intakes. The impact of some of the nutrition initiatives could not be determined from the data collected. Meals consumed by the test subjects in the Ft. Riley and Ft. Lewis dining facilities were nutritionally adequate, either meeting or exceeding the MRDA for all nutrients evaluated. Whether female soldiers eating regularly from the same menus would also meet all vitamin and or mineral recommendations cannot be answered from these studies, therefore this issue will have to be addressed in future studies.

Sodium intakes were slightly higher for the Ft. Riley test subjects than for the Ft. Lewis test subjects. Sodium from salt added by the test subjects at the table was very similar for both groups. Use of low fat milk instead of whole milk helped to reduce fat intake of milk drinkers by approximately 1%. Fat intakes were 37.5% and 37.4% respectively, of the total calories which is 2% greater than the target level of 35% or less. Average cholesterol intakes were 2.5 times the levels recommended by The American Heart Association and others. Eggs were consumed by a large majority of both test populations at the breakfast meal and contributed to almost half of the total dietary cholesterol intake.

Whether or not the Ft. Riley and the Ft. Lewis dining facility studies are representative of all Army dining facilities has not been determined. Therefore, additional studies of both military and contractor-operated garrison dining facilities are recommended to allow conclusions to be drawn that are applicable to the total Army garrison feeding program. In addition, considerations should be given to implementing

nutrition education programs and/or menu modifications planned to further reduce soldiers' intakes of sodium and fat, with special emphasis directed towards lowering cholesterol intake.



## RECOMMENDATIONS

1. Continue revision of the Armed Forces Recipe File to further reduce sodium in the recipes. A variety of herbs and spices could be substituted in place of salt and other high sodium seasonings to insure palatability of the foods prepared.
2. Continue to decrease the percentage of calories obtained from fat to 35% or less of total calories through nutrition education and emphasis on compliance to Army Regulation 30-1 standards.
3. Provide soldiers low cholesterol, low fat alternatives to eggs, and evaluate the acceptability and impact of using this approach to moderate soldiers' cholesterol intakes.
4. To assist in evaluating the effectiveness of a program designed to moderate soldiers' cholesterol intakes, have OTSG establish a cholesterol intake target level for armed forces personnel.
5. Compare nutrient intakes in other military-operated and contractor-operated dining facilities to further evaluate the effectiveness of ODCSLOG nutrition initiatives.
6. Periodic monitoring of the implementation of and compliance to Army Regulation 30-1 (5) requirements for menu, food preparation and serving standards should be ensured.
7. Assess the nutrient intakes of female soldiers in future studies.
8. Ensure that soldiers receive a block of nutrition education which could be included as a component of the health maintenance and promotion program.

FIGURE 1

# AVERAGE DAILY VITAMIN INTAKES COMPARED WITH MRDA VALUES

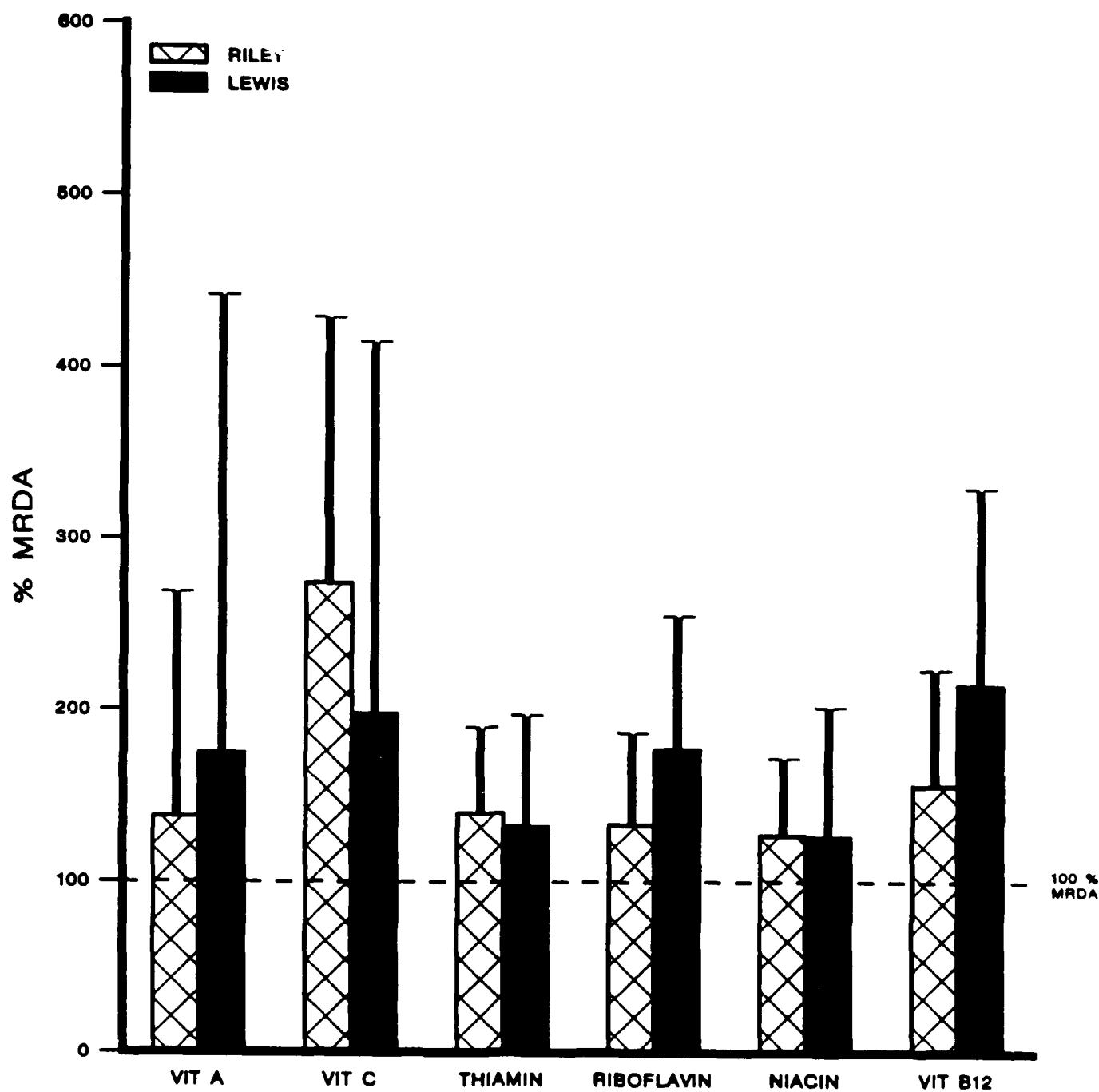
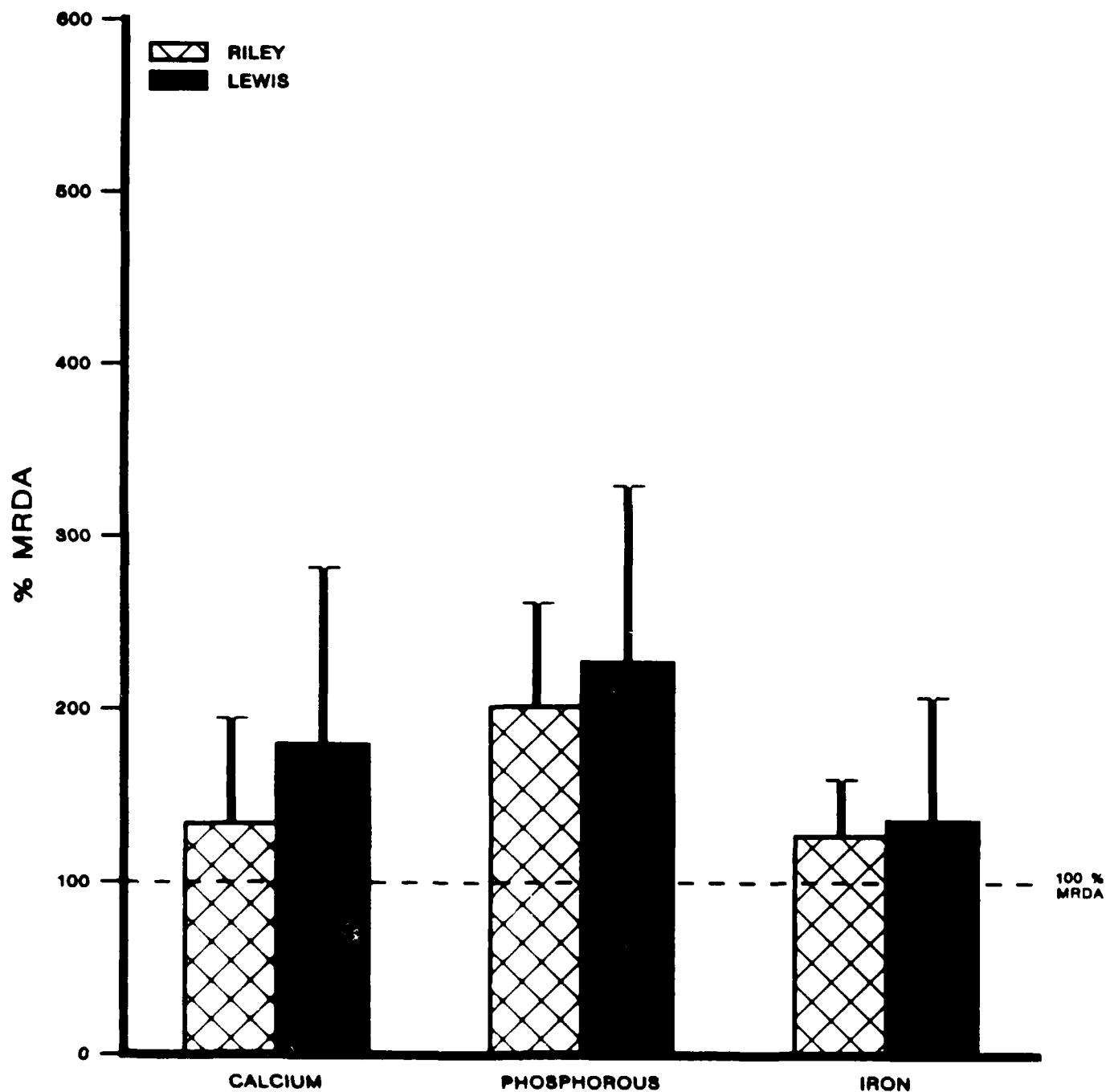
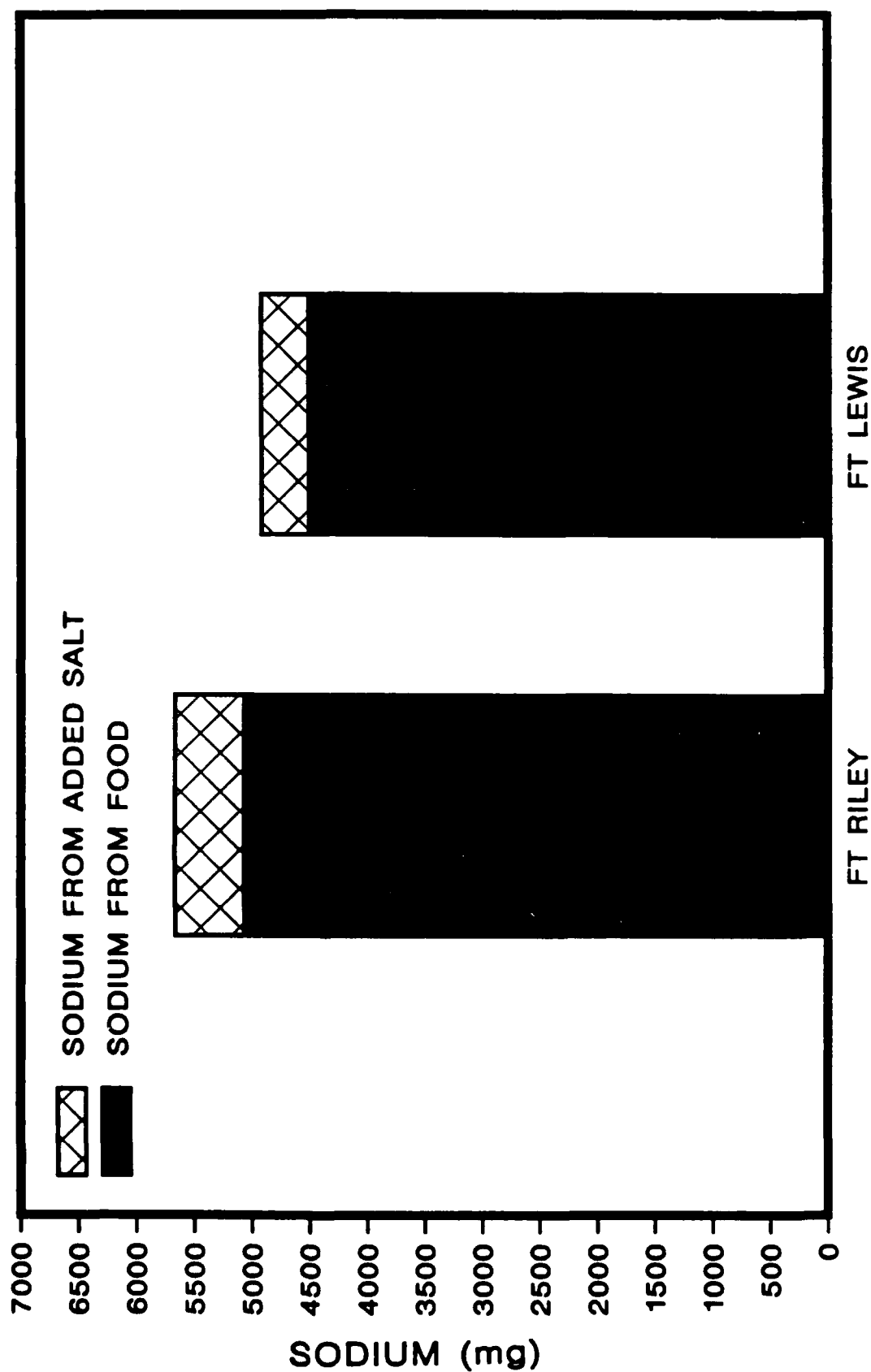


FIGURE 2

## AVERAGE DAILY MINERAL INTAKES COMPARED WITH MRDA VALUES



# COMPARISON OF AVERAGE SODIUM INTAKES



# COMPARISON OF AVERAGE SODIUM INTAKES PER 1000 CALORIES

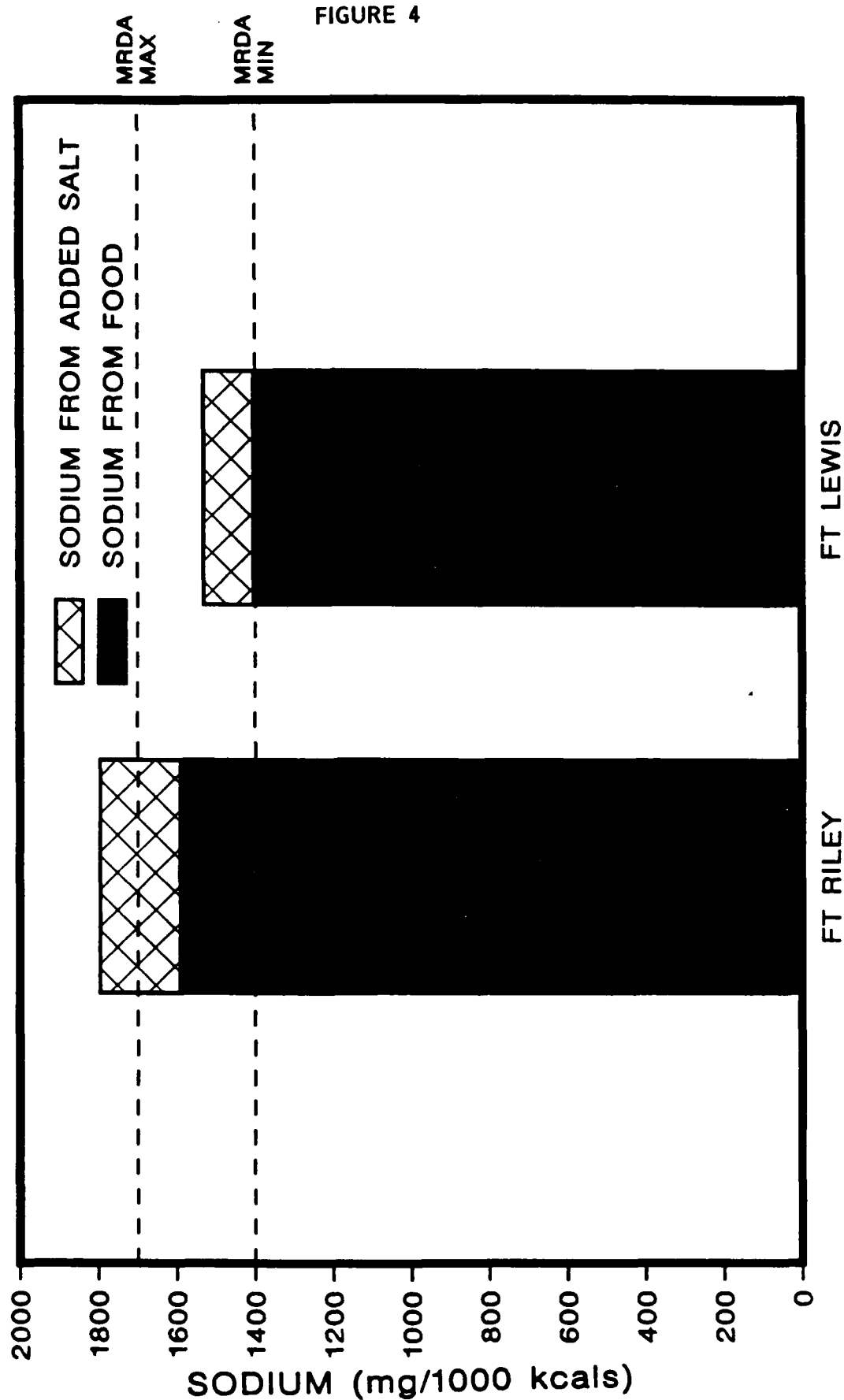
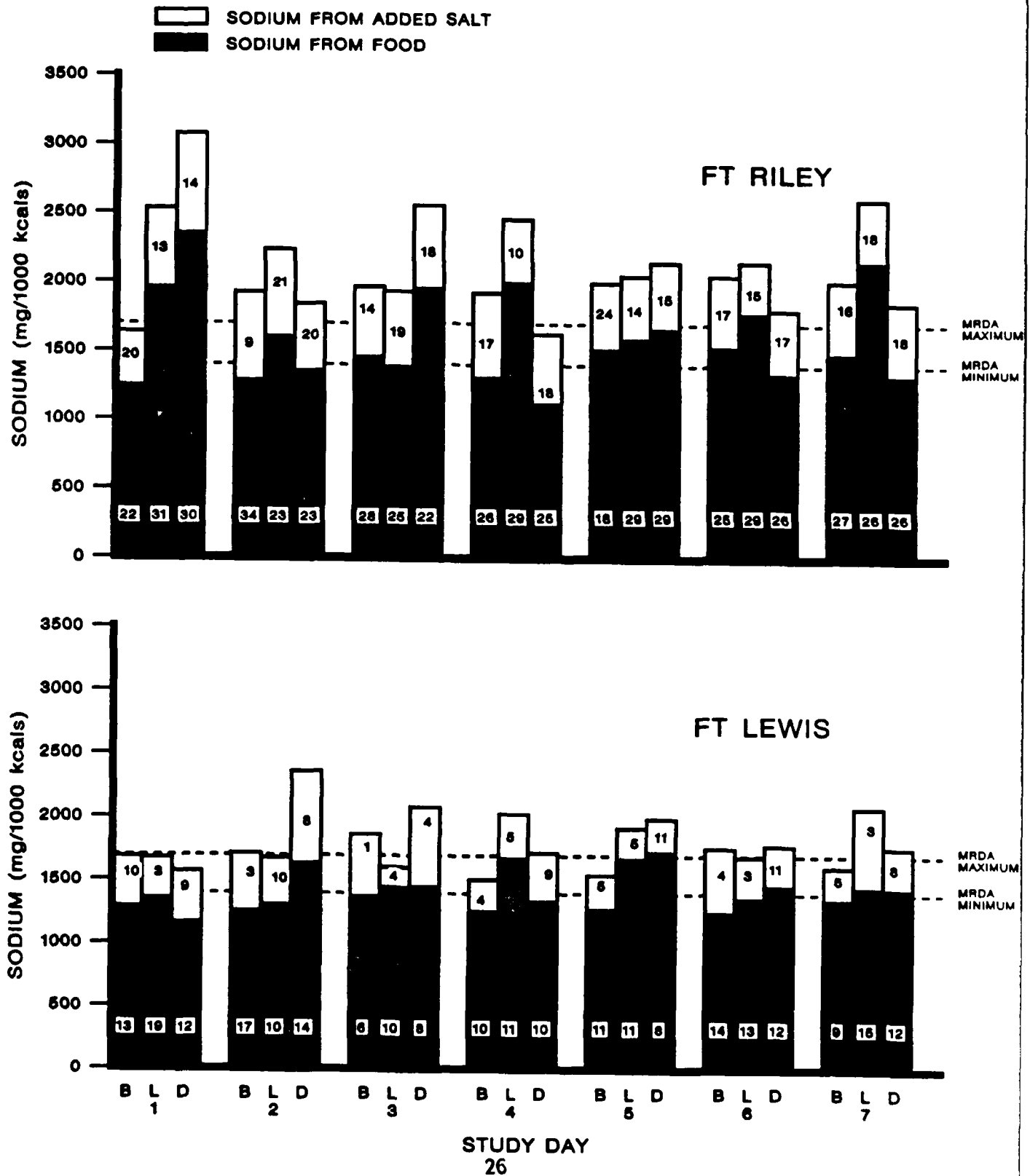


FIGURE 5

# AVERAGE DAILY SODIUM INTAKES



# COMPARISON OF AVERAGE FAT INTAKES ON A PER MEAL BASIS

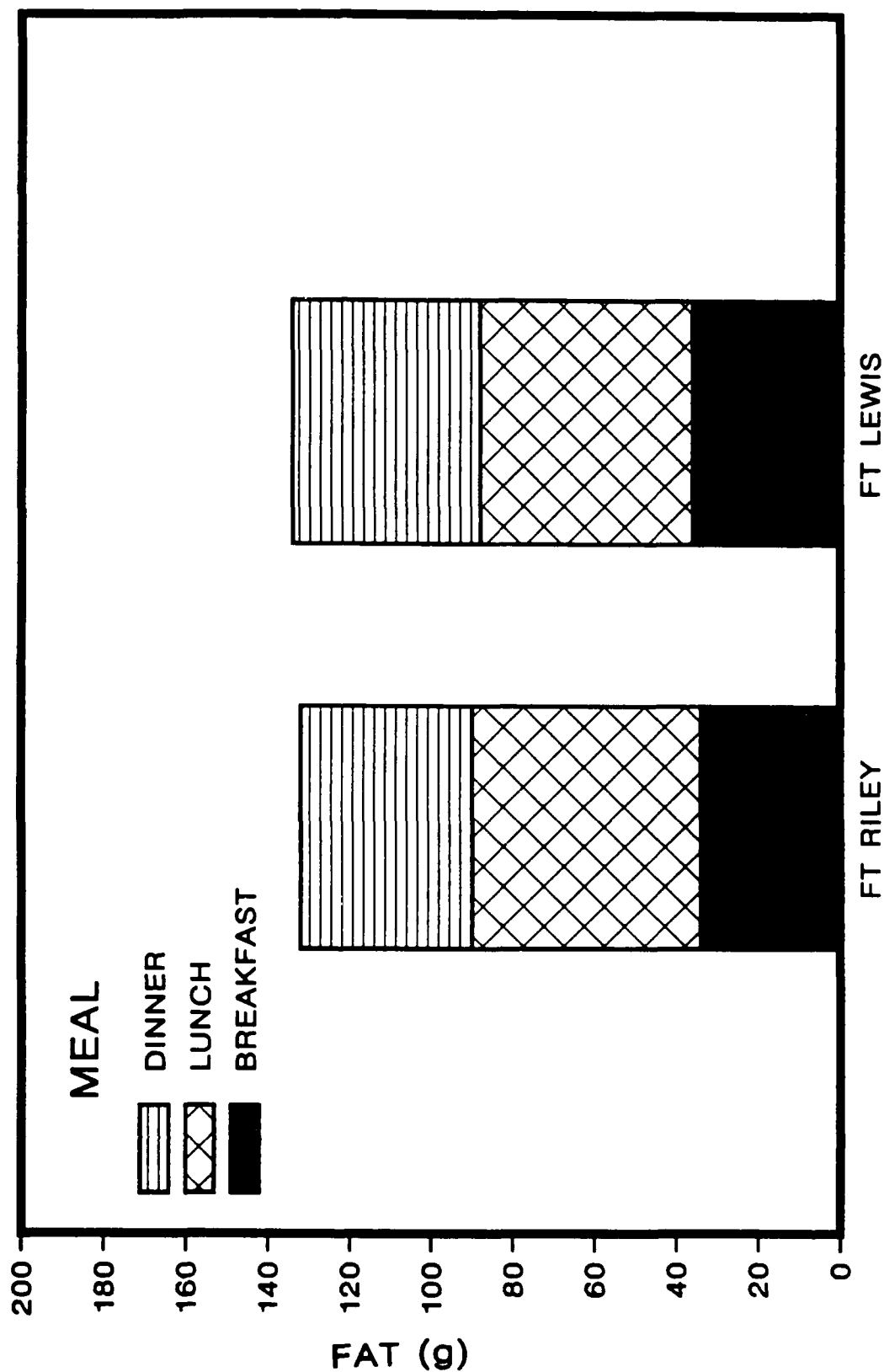
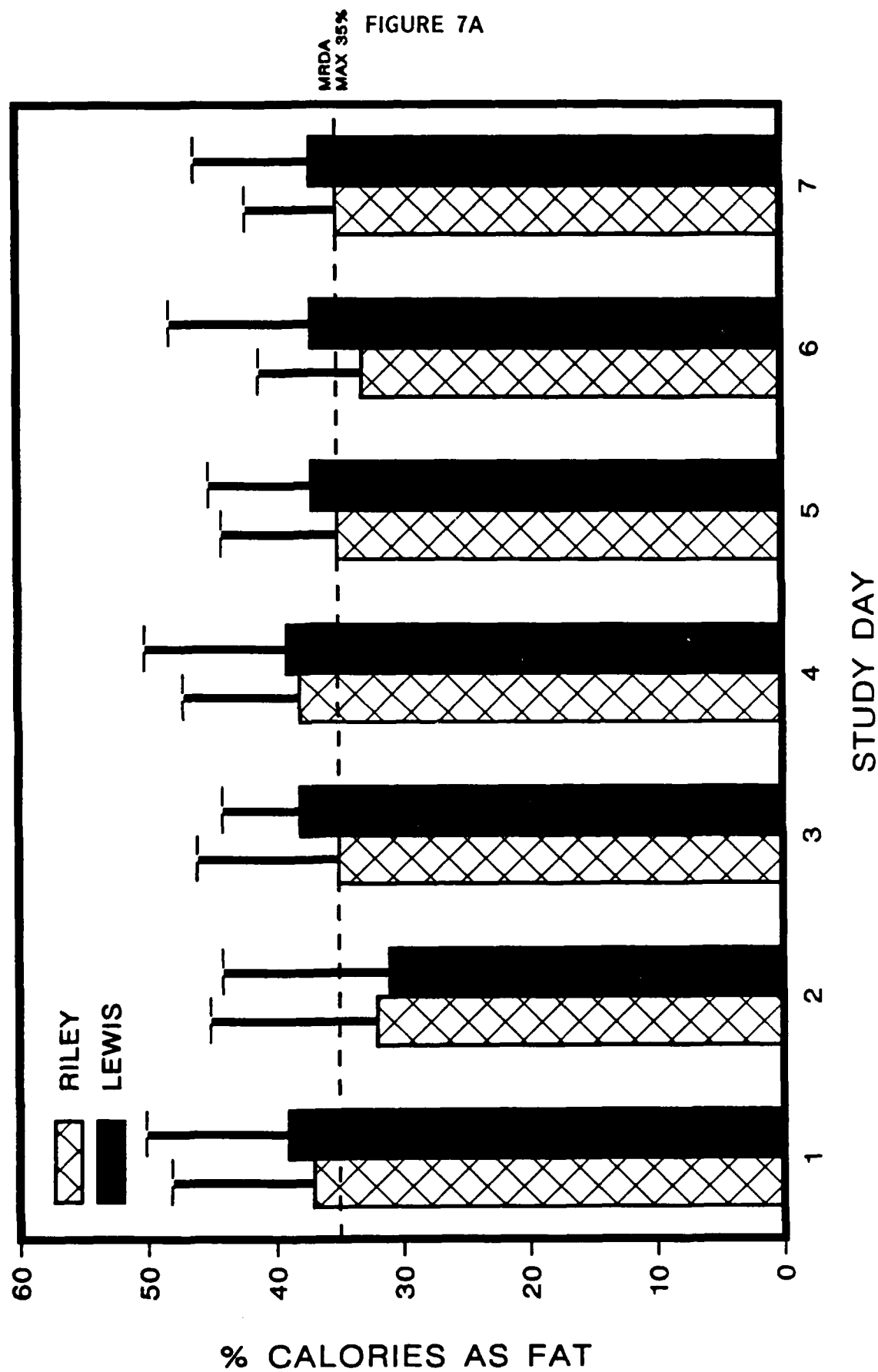


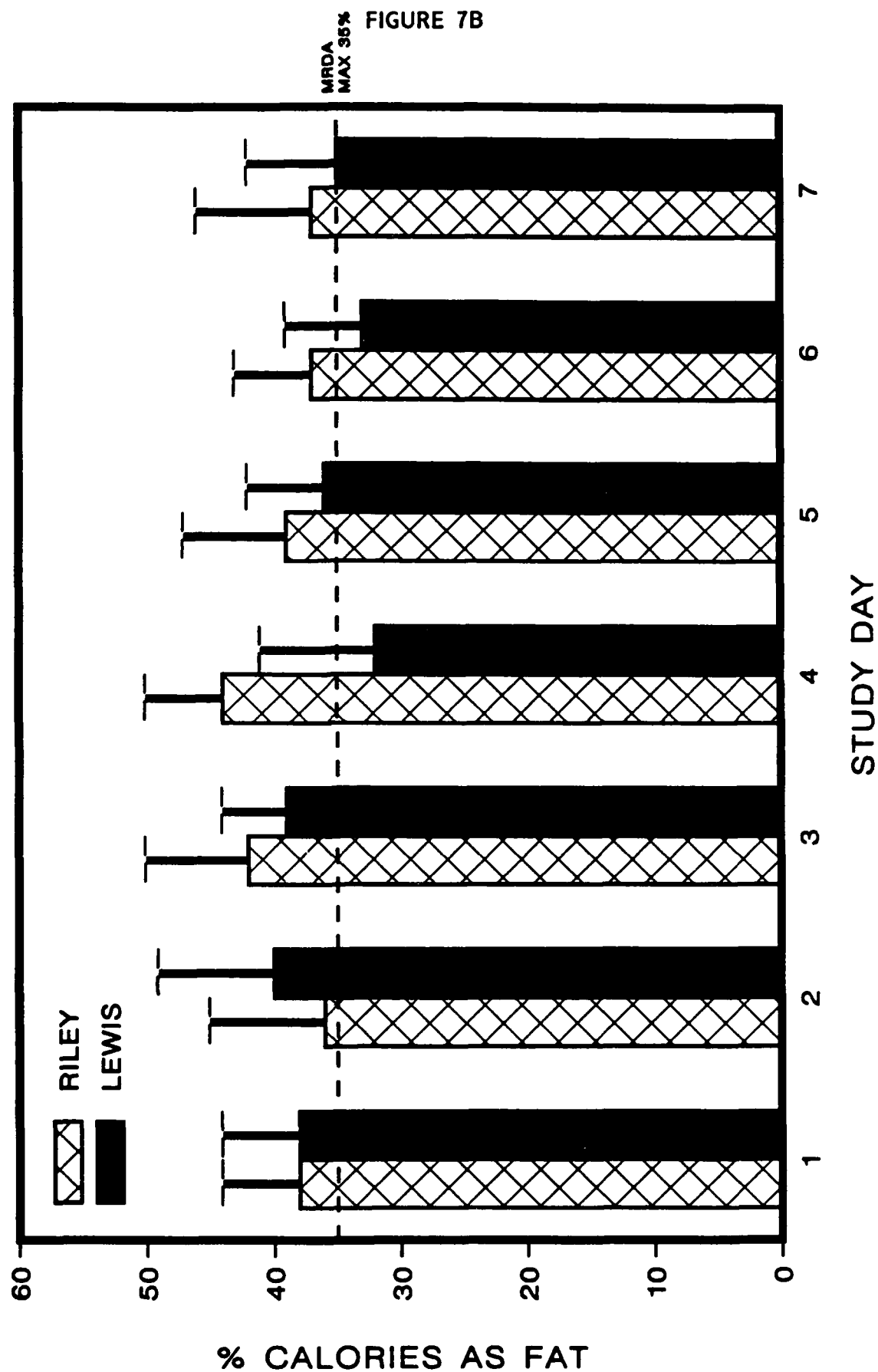
FIGURE 6

# PERCENTAGE OF KCALS AS FAT DURING BREAKFAST A COMPARISON OF FORTS RILEY AND LEWIS

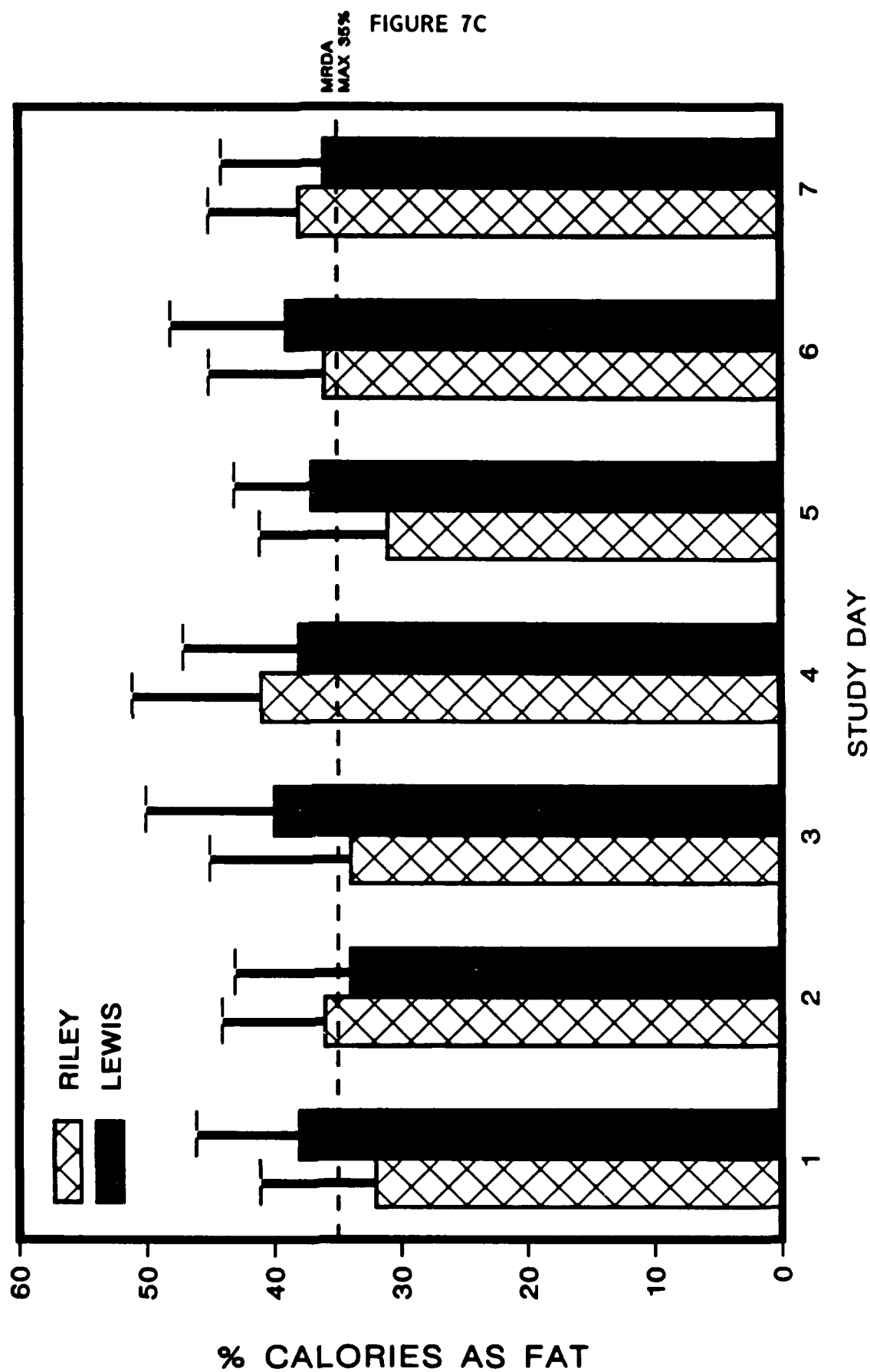




# PERCENTAGE OF KCALS AS FAT DURING LUNCH A COMPARISON OF FORTS RILEY AND LEWIS



# PERCENTAGE OF KCALS AS FAT DURING DINNER A COMPARISON OF FORTS RILEY AND LEWIS



# COMPARISON OF AVERAGE CHOLESTEROL INTAKES ON A PER MEAL BASIS

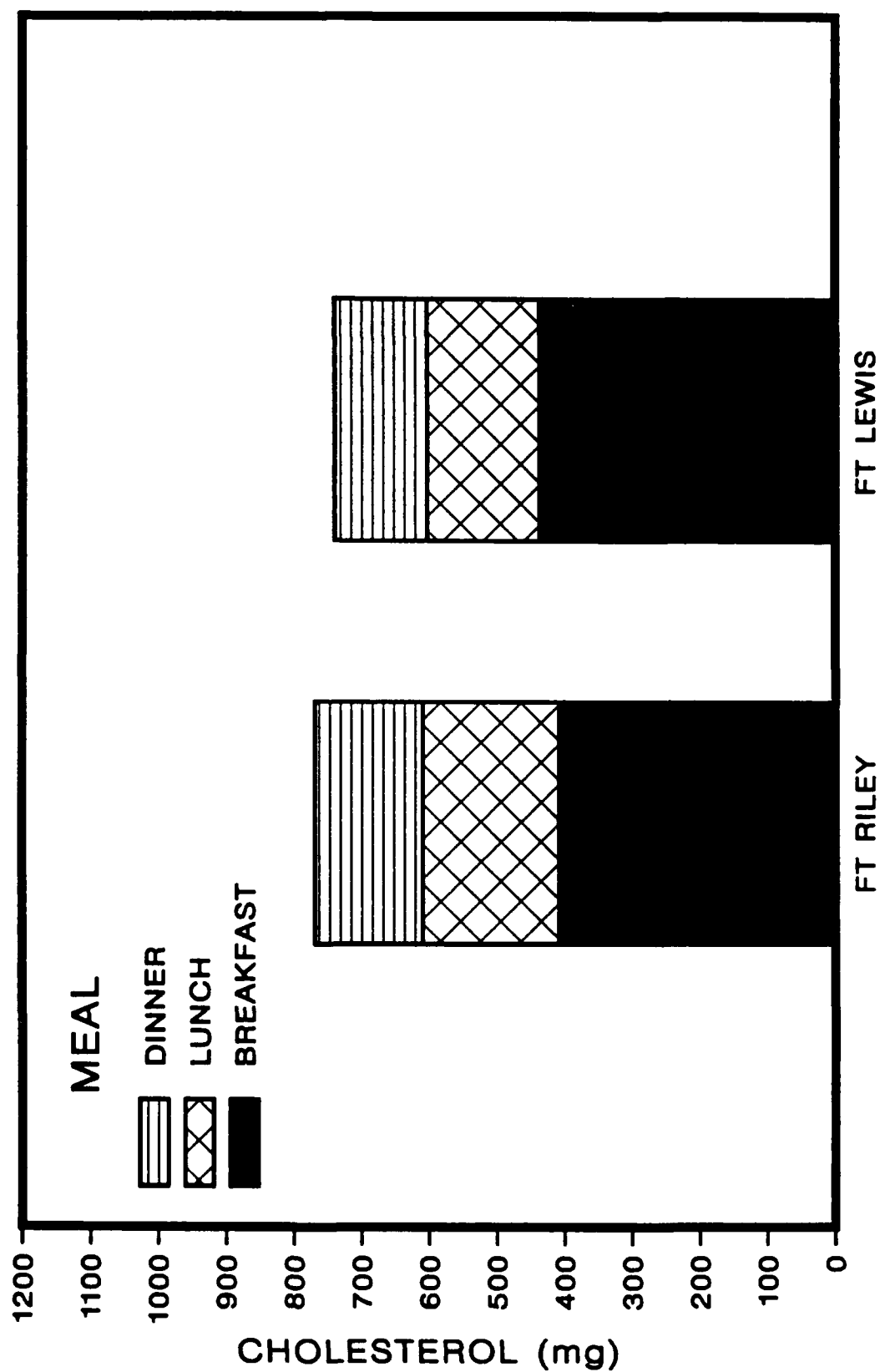
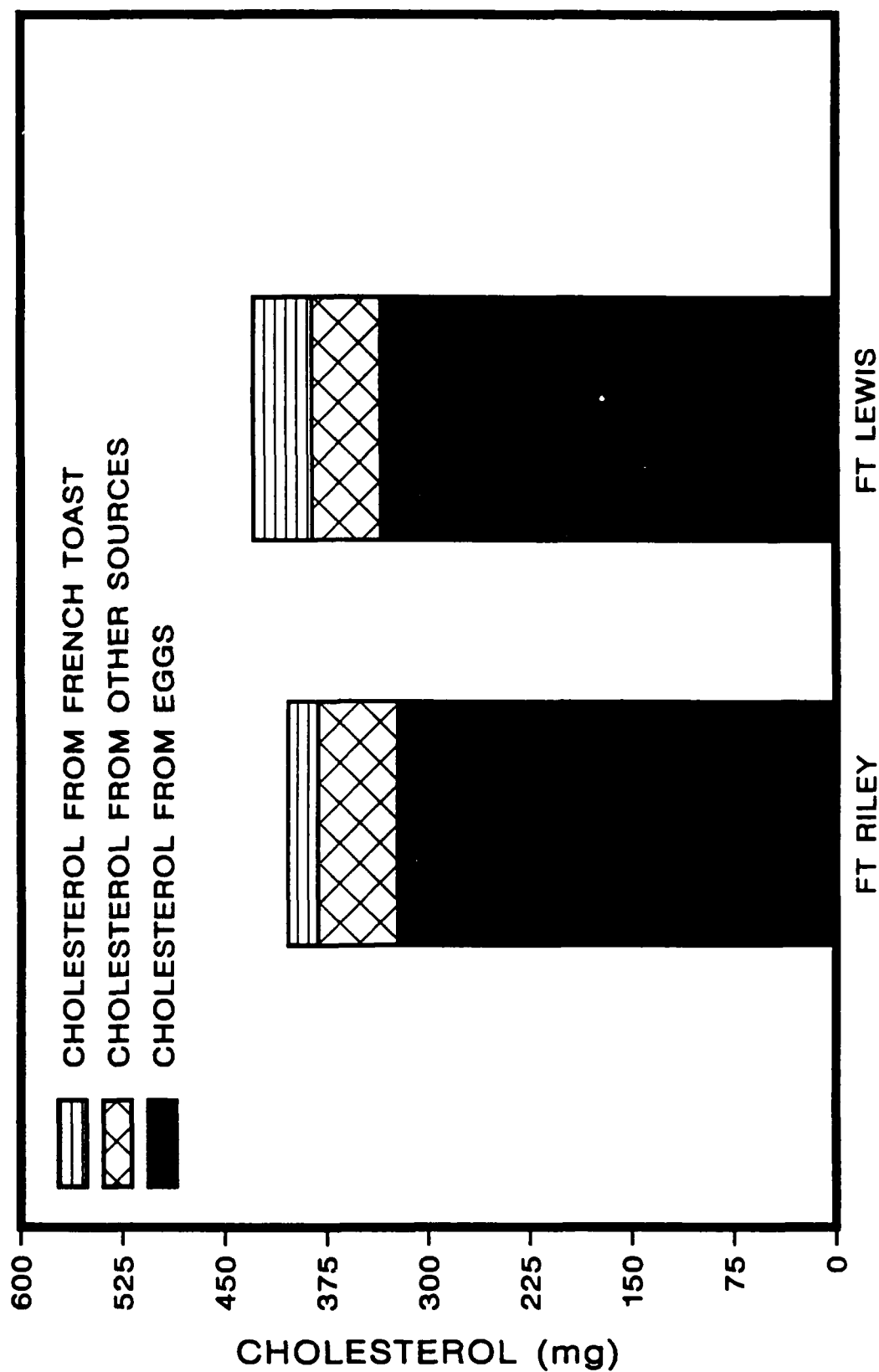


FIGURE 8

# COMPARISON OF AVERAGE BREAKFAST CHOLESTEROL INTAKES



# COMPARISON OF AVERAGE CHOLESTEROL INTAKES PER 1000 CALORIES

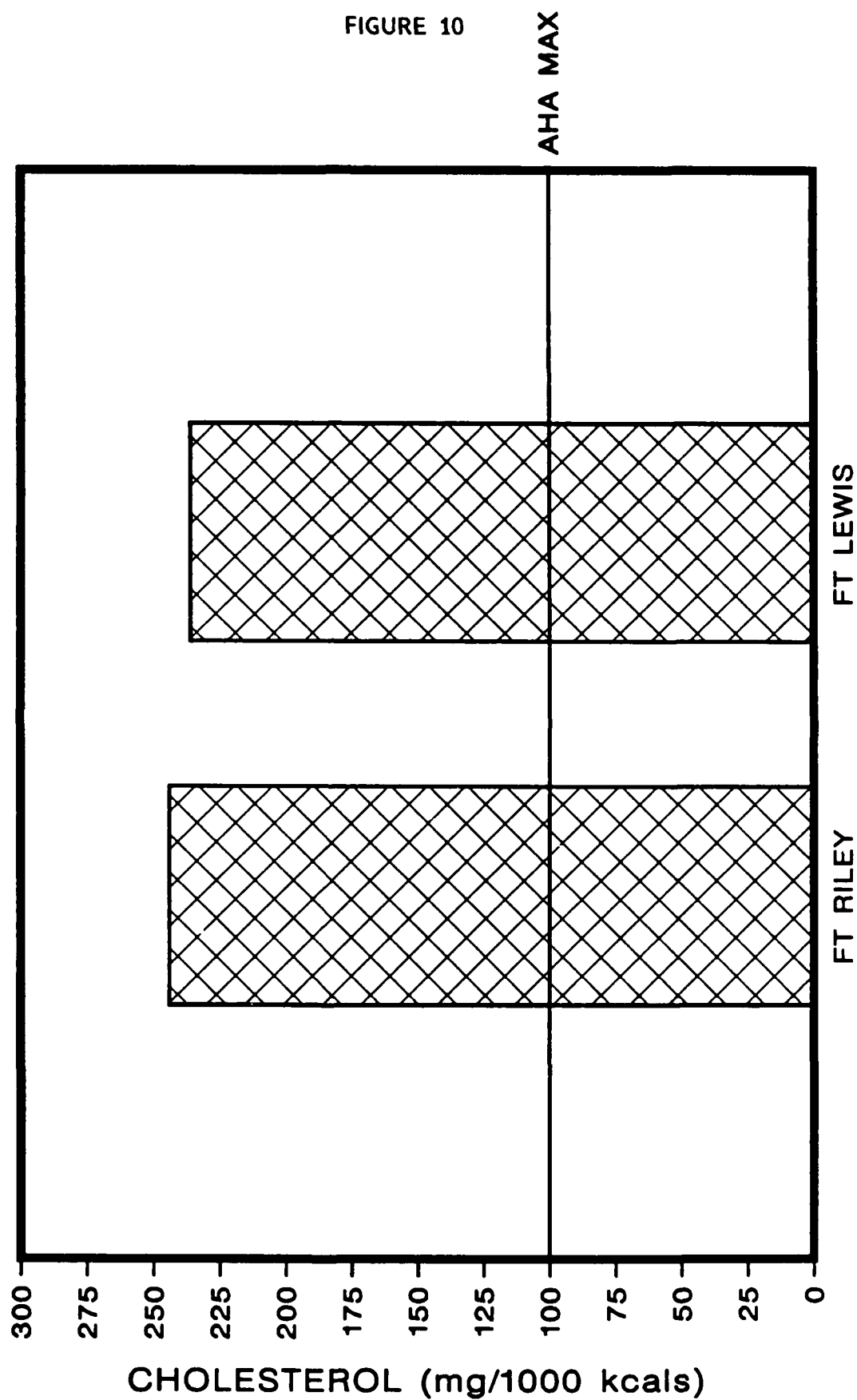


TABLE 1

Comparison of Average Daily Intakes of Selected  
Nutrients ( $\bar{x} \pm SD$ ) with OTSG MRDA

<u>Nutrient</u>	<u>Ft. Riley</u>	<u>Ft. Lewis</u>	<u>MRDA Level</u>
Energy (Kcal)	3112 $\pm$ 758	3173 $\pm$ 616	2800-3600
Protein (gm)	123 $\pm$ 31.2	125 $\pm$ 22.5	100
Vitamin A (mcg RE)	1376 $\pm$ 1305	1816 $\pm$ 1026	1000
Ascorbic Acid (mg)	164 $\pm$ 92	132 $\pm$ 77	60
Thiamin (mg)	2.3 $\pm$ 0.8	2.2 $\pm$ 0.5	1.6
Riboflavin (mg)	2.5 $\pm$ 1.0	3.2 $\pm$ 0.8	1.9
Niacin (mg)	26.7 $\pm$ 9.3	26.3 $\pm$ 4.8	21
Vitamin B <sub>12</sub> (mcg)	4.7 $\pm$ 2.0	6.3 $\pm$ 1.8	3.0
Calcium (mg)	1335 $\pm$ 597	1752 $\pm$ 629	800-1200
Phosphorus (mg)	2020 $\pm$ 590	2231 $\pm$ 487	800-1200
Iron (mg)	17.7 $\pm$ 4.5	18.7 $\pm$ 3.6	10-18

TABLE 2

BENEFITS OF SUBSTITUTING LOW FAT (2% FAT) MILK FOR WHOLE MILKFT RILEYWITH 2% FAT MILK      WITH 3.3% FAT MILKINTAKE FROM  
2% MILK      TOTAL DAILY  
INTAKE      INTAKE IF  
3.3% MILK      TOTAL DAILY  
INTAKE

ENERGY (KCAL)	151	3112	190.3	3151.3
FAT (GM)	5.4	130	9.2	133.8
(% FAT CAL)	32.2	37.6	43	38.2
CHOLESTEROL (MG)	20.2	760	39	778.8
QUANTITY (G)	287.8	--	287.8	--

CALCULATIONS BASED ON 29 TEST SUBJECTS WHO CONSUMED MILK AT LEAST ONCE DURING THE 7 DAY STUDY

TABLE 3

BENEFITS OF SUBSTITUTING LOW FAT (2% FAT) MILK FOR WHOLE MILKFT LEWISWITH 2% FAT MILK      WITH 3.3% FAT MILK

	<u>INTAKE FROM 2% MILK</u>	<u>TOTAL DAILY INTAKE</u>	<u>INTAKE IF 3.3% MILK</u>	<u>TOTAL DAILY INTAKE</u>
ENERGY (KCAL)	171	3173	201.4	3203
FAT (GM)	6.0	132	9.7	135.7
(% FAT CAL)	32	37.4	43	38.6
CHOLESTEROL (MG)	21	748	38	766.6
QUANTITY (G)	307	--	307	--

ENERGY (KCAL)

171

3173

201.4

3203

FAT (GM)

6.0

132

9.7

135.7

(% FAT CAL)

32

37.4

43

38.6

CHOLESTEROL (MG)

21

748

38

766.6

QUANTITY (G)

307

--

307

--

CALCULATIONS BASED ON 31 TEST SUBJECTS WHO CONSUMED MILK AT LEAST ONCE DURING THE 7 DAY STUDY



TABLE 4

MODIFICATION OF SCRAMBLED EGGS TO POTENTIALLY DECREASE CHOLESTEROL INTAKEFT RILEY

	<u>WITH WHOLE EGGS</u>		<u>WITH EGG SUBSTITUTE</u>	
	<u>INTAKE FROM SCRAMBLED EGGS</u>	<u>TOTAL DAILY INTAKE</u>	<u>INTAKE IF EGG SUBSTITUTE</u>	<u>TOTAL DAILY INTAKE</u>
ENERGY (KCAL)	87.0	3112	15.2	3040.2
FAT (GM)	6.5	130	0.7	124.2
(% FAT KCAL)	66.0	37	41.0	36.8
CHOLESTEROL	226.4	760	0.0	533.6
(MG/1000 KCAL)	2602.0	244	0.0	175.5
SODIUM (MG)	143.5	5701	33.0	5589.5
QUANTITY (G)	59.0	--	59.0	--

CALCULATIONS BASED ON 41 SUBJECTS WHO CONSUMED SCRAMBLED EGGS AT LEAST ONCE DURING THE 7 DAY STUDY

TABLE 5

MODIFICATION OF SCRAMBLED EGGS TO POTENTIALLY DECREASE CHOLESTEROL INTAKEFT LEWISWITH WHOLE EGGSWITH EGG SUBSTITUTE

INTAKE FROM SCRAMBLED EGGS	TOTAL DAILY INTAKE	INTAKE USING EGG SUBSTITUTE	TOTAL DAILY INTAKE
-------------------------------	-----------------------	--------------------------------	-----------------------

ENERGY (KCAL)

59.5

3173

10.4

3123.9

FAT (GM)

4.4

132

.5

128.1

(% FAT KCAL)

66.6

37

41.3

36.9

CHOLESTEROL (MG)

156.5

748

0

591.5

(MG/1000 KCAL)

2630.0

236

0

189.3

SODIUM (MG)

97.8

5027

22.5

4941.7

QUANTITY (G)

40.3

--

40.3

--

CALCULATIONS BASED ON 31 SUBJECTS WHO CONSUMED SCRAMBLED EGGS AT LEAST ONCE DURING THE 7 DAY STUDY

TABLE 6A

COMPARISON OF FT RILEY DATA AND FT LEWIS DATA  
WITH OTHER RECENT NUTRITIONAL EVALUATIONS  
OF MILITARY FEEDING SYSTEMS  
AVERAGE DAILY INTAKES OF SELECTED NUTRIENTS

	FT RILEY MALE	FT LEWIS MALE	FT SILL 3A-RATIONS
ENERGY (KCAL)	3112	3173	3713
FAT (% TOTAL KCAL)	37.6	37.4	37
CHOLESTEROL (MG)	760	748	749
(MG/1000 KCAL)	244	236	202
SODIUM (MG)	5701	5021	7441
SODIUM (MG/1000 KCAL)	1796	1532	2004

TABLE 6B

COMPARISON OF FT RILEY DATA AND FT LEWIS DATAWITH OTHER RECENT NUTRITIONAL EVALUATIONSOF MILITARY FEEDING SYSTEMSAVERAGE DAILY INTAKES OF SELECTED NUTRIENTS

	FT RILEY MALE	FT LEWIS MALE	2A/1 MRE CFFS-FDTE	2T/1MRE CFFS-FDTE
ENERGY (KCAL)	3112	3173	3047	2689
FAT (% TOTAL KCAL)	37.6	37.4	42	31
CHOLESTEROL (MG)	760	748	770	294
(MG/1000 KCAL)	244	236	253	109
SODIUM (MG)	5701	5021	5454	4749
(MG/1000 KCAL)	1796	1532	1805	1757

TABLE 6C

COMPARISON OF FT RILEY DATA AND FT LEWIS DATA  
WITH OTHER RECENT NUTRITIONAL EVALUATIONS  
OF MILITARY FEEDING SYSTEMS  
AVERAGE DAILY INTAKES OF SELECTED NUTRIENTS

	FT RILEY MALE	FT LEWIS MALE	USMA-WEST POINT MALE FEMALE
ENERGY (KCAL)	3112	3173	3738 2454
FAT (% TOTAL CAL)	37.6	37.4	39 39
CHOLESTEROL (MG)	760	748	599 403
(MG/1000 KCAL)	244	236	160 164
SODIUM (MG)	5701	5021	4048 2764
(MG/1000 KCAL)	1796	1532	A <sub>1083</sub> A <sub>1126</sub>

<sup>A</sup>FOOD SERVED. DOES NOT INCLUDE SALT ADDED

TABLE 7

COMPARISON WITH NATIONWIDE USDA FOOD CONSUMPTION SURVEY

AVERAGE DAILY INTAKES OF SELECTED NUTRIENTS

	FT RILEY MALE	FT LEWIS MALE	NATIONWIDE FOOD CONSUMPTION SURVEY 1980 <sup>A</sup> 1985 <sup>B</sup>
FAT (% TOTAL KCAL)	37.6	37.4	42 35.3
CHOLESTEROL (MG)	760	748	511 443
CHOLESTEROL (MG/1000 KCAL)	244	236	226 166
SODIUM (MG/1000 KCAL)	1796 (1592) <sup>C</sup>	1532 (1403) <sup>C</sup>	1551 <sup>D</sup> 1418 <sup>D</sup>

<sup>A</sup>DATA FOR MALES AGES 19-64 YEARS

<sup>B</sup>DATA FOR MALES AGES 19-34 YEARS

<sup>C</sup>SODIUM FROM FOOD AS SERVED

<sup>D</sup>DOES NOT INCLUDE ADDED SALT (COOKING OR AT TABLE)

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## APPENDIX A

A copy of the menu actually served on each day of the Ft. Riley study is provided in this appendix. Usage of leftovers at meals has been annotated using (l/o) to designate a leftover food item.

The breakfast menu consisted of a variety of foods all available on a daily basis were as follows:

Chilled Fresh Fruit	French Toast
Chilled Fruit Juices	Griddle Cakes
Buttered Grits	Hot Maple Syrup
Baked Bacon Slices	Melted Butter
Assorted Dry Cereals	Toast
Baked Sausage Links	Butter/Margarine
Creamed Ground Beef	Jam/Jelly
Hash Browned Potatoes	Assorted Pastries
Baking Powder Biscuits	Assorted Yogurt
Fried Eggs	Milk
Scrambled Eggs	Coffee
Hard Cooked Eggs	Tea/Lemon Wedges

Pastries served varied from day to day and were as follows:

29 Jul 86	- Doughnuts
	Sweet Rolls
30 Jul 86	- Coffee Cake w/Streussel Topping
31 Jul 86	- Kolaches
	Cinnamon Rolls
	Cinnamon Twists
1 Aug 86	- Cinnamon Rolls
2 Aug 86	- Kolaches
4 Aug 86	- Cinnamon Rolls With Nuts
5 Aug 86	- Kolaches
6 Aug 86	- Kolaches
	Cinnamon Rolls with Nuts

On 31 Jul 86 and 6 Aug 86, peanut butter and honey were available. Fruits served 29 Jul - 4 Aug 86 were limited to oranges and apples. Bananas were served on 5 Aug 86. On 6 Aug 86 assorted fruits including oranges, peaches, grapes, and pears were served at the salad bar area.



## FT RILEY

Lunch and supper menus included standard short order, sandwich, salad, soup, fruit, yogurt, bread, ice cream, and beverage items. These are listed below, and daily menus follow specifying those items that varied from day to day:

### Short Order

Grilled Hamburgers  
Grilled Cheeseburgers  
Hamburger Buns  
French Fries

### Sandwiches

Egg Salad  
Tuna Salad  
Cheese  
Ham and Cheese  
BLT  
Hoagie  
Corn Chips or Potato Chips  
Chef's Salad  
Chef's Soup Du Jour

Assorted Yogurt  
Assorted Fresh Fruit  
Assorted Ice Cream  
Assorted Breads  
Butter/Margarine Patties

### Salad Bar

Shredded Lettuce  
Tomato  
Cucumber  
Green Pepper  
Bologna  
Grated Cheese  
Hard Cooked Egg

### Beverages

2% Fat Milk  
Chocolate Milk (2%)  
Coffee  
Tea  
Koolaid  
Carbonated Beverages

## FT RILEY

29 July 1986 (Day 1)

### Lunch

Baked Lasagna  
Chicken Curry  
Parsley Buttered Potatoes  
Hash Browned Potatoes (l/o)  
Steamed Carrots  
Steamed Brussel Sprouts  
Carrot, P/A, and Raisin Salad  
Devil's Food Cake/Vanilla Frosting  
White Cake/Chocolate Frosting  
Pineapple Pie  
Oatmeal Cookies

### Dinner

Stuffed Green Peppers  
Baked Ham/P/A Sauce  
Brown Gravy  
Steamed Rice  
Mashed Potatoes  
Mixed Vegetables  
Steamed Green Beans  
Apple w/Raisin Salad  
Devil's Food Cake/Vanilla Frosting  
White Cake/Chocolate Frosting  
Pineapple Pie  
Oatmeal Cookies

30 July 1986 (Day 2)

### Lunch

Hot Roast Beef Sandwich  
Brown Gravy  
Deep Fried Fish Portion  
Tartar Sauce  
Mashed Potatoes  
Rissolle Potatoes  
Hash Browned Potatoes (l/o)  
Steamed Carrots  
Corn  
Macaroni Salad  
Double Chocolate Chip Cookies  
Ginger Bread w/Lemon Sauce

### Dinner

Fried Chicken  
Chicken Gravy  
BBQ Chicken  
Swiss Steak  
Mashed Potatoes  
Steamed Rice  
Green Beans  
Broccoli w/Cheese sauce  
Steamed carrots (l/o)  
Macaroni Salad  
Double Chocolate Chip Cookies  
Ginger Bread w/Lemon Sauce

FT RILEY

31 July 1986 (Day 3)

Lunch

Beef Stew w/Biscuits  
Roast Pork Loin  
Swiss Steak (l/o)  
Brown Gravy  
Mashed Potatoes  
Buttered Noodles  
Steamed Rice (l/o)  
Wax Beans  
Peas and Carrots  
Three Bean Salad  
Chocolate Pie/Whipped Topping  
White cake/Lemon Sauce

Dinner

Chili Con Carne w/Beans  
Beef Kabobs  
Roast Pork (l/o)  
Brown Gravy  
Mashed Potatoes  
Steamed Rice  
Corn O'Brien  
Steamed Mixed Vegetables  
Three Bean Salad  
Chocolate Pie/Whipped Topping  
White cake/Lemon Sauce

1 August 1986 (Day 4)

Lunch

New England Boiled Dinner  
Veal Parmesan  
Brown Gravy  
Mashed Potatoes  
Steamed Carrots  
Steamed Cabbage  
German Coleslaw  
Chocolate Cookies  
Choc Cream Pie/Whipped Topping  
White Cake/Choc Icing

Hot Dogs in addition to usual  
short order items

Dinner

Baked Chicken  
Chicken Gravy  
Batter Fried Cod  
Tartar Sauce  
New England Boiled Dinner (l/o)  
Mashed Potatoes  
Rissolle Potatoes  
Broccoli/Cheese Sauce  
Steamed Carrots (l/o)  
Steamed Cabbage (l/o)  
German Coleslaw  
Chilled Peach Slices  
Chocolate Cookies  
Choc Cream Pie/Whipped Topping  
White Cake/Choc Icing

## FT RILEY

### 4 August 1986 (Day 5)

#### Lunch

Turkey Nuggets  
Turkey Gravy  
Baked Lasagna  
Rissolle Potatoes  
Hash Browned Potatoes (I/o)  
Buttered Mixed Vegetables  
Brussels Sprouts  
Carrott, P/A and Raisin Salad  
White Cake/Choc Frosting  
Choc Brownies  
Cherry Pie  
Apple Pie  
Blueberry Pie

#### Dinner

Grilled Liver w/Onions  
Brown Gravy  
Spaghetti w/Meatsauce  
Turkey Nuggets (I/o)  
Mashed Potatoes  
Toasted Garlic Bread  
Stewed Tomatoes w/Green Beans  
Buttered Mixed Vegetables  
Carrot, P/A & Raisin Salad  
White Cake/Choc Frosting  
Cherry Pie  
Apple Pie  
Blueberry Pie

### 5 August 1986 (Day 6)

#### Lunch

Beef Curry  
Honey Glazed Cornish Hen  
Chicken Gravy  
Combination Pizza  
Mashed Potatoes  
Steamed Rice  
Hash Browned Potatoes (I/o)  
Whole Kernel Corn  
Buttered Peas  
Macaroni Salad  
Three Bean Salad  
Devil's Food Cake/Choc Frosting  
Sugar Cookies  
White Cake/Choc Icing  
Apple Pie  
Cherry Pie  
Blueberry Pie

#### Dinner

Roast Pork Loin  
Brown Gravy  
Beef Curry (I/o)  
Cornish Hens (I/o)  
Deep Fried Shrimp  
Rice (I/o)  
Mashed Potatoes  
Buttered Corn  
Peas and Carrots  
Three Bean Salad  
Chilled Applesauce  
Devil's Food Cake/Choc Frosting  
Sugar Cookies  
White Cake/Choc Icing  
Apple Pie  
Cherry Pie  
Blueberry Pie

FT RILEY

6 August 1986 (Day 7)

Lunch

Meatloaf  
Baked Pork Chops/Apple Rings  
Brown Gravy  
Mashed Potatoes  
Parsley Buttered Potatoes  
Sweet Peas in White Sauce  
Steamed Carrots  
Cucumber and Onion Salad  
Applesauce  
Apple Pie  
Cherry Pie  
Blueberry Pie

Dinner

Beef Stroganoff  
Baked Tuna and Noodles  
Pork Chops (l/o)  
Steamed Rice  
Peas and Carrots in White Sauce  
Buttered Succotash  
Cucumber and Onion Salad  
Chocolate Chip Cookies  
Apple Pie  
Cherry Pie  
Blueberry Pie

## APPENDIX B

A copy of the menu served on each day of the Ft. Lewis study is provided in this appendix.

The breakfast menu consisted of a variety of foods which were available on a daily basis as listed:

French Toast	Chilled Fruit Juices
Hot Cakes	Assorted Fresh Fruit
Hot Grits	Assorted Dry Cereals
Baked Bacon Slices	Toast
Ham Slices	Hot Maple Syrup
Grilled Bologna Slices	Margarine
Saus. Patties	Assorted Jams/Jellies
Creamed Ground Beef	Peanut butter
Cottage Fried Potatoes	Ketchup
Fried Eggs	Chilled Milk
Scrambled Eggs	Coffee
Hard Cooked Eggs	Tea/Lemon Wedges
Omelets to Order	Assorted Condiments

A baked breakfast product was served almost everyday of the study and were as follows: quick apple coffee cake, biscuits, glazed donuts, and baking powder biscuits.

Fresh fruits served were primarily oranges and apples. Bananas and pears were also served on several days. Assorted fresh fruits were served at the beginning of the hot line which was used as the dessert area at lunch and dinner meals.

## FT LEWIS

Lunch and dinner menus included short order, sandwich, salad, soup (only available at lunch), fruit (predominantly oranges and apples), fruit yogurt, assorted breads, soft serve ice cream, ice cream cones, and beverage items. The menus are as follows:

### Short Order

Grilled Hamburgers  
Grilled Cheeseburgers  
Grilled Frankfurters  
Hamburger & Frankfurter Buns  
Fried Fish Squares  
French Fries  
Potato Chips

### Sandwiches

Egg Salad  
Tuna Salad  
Ham and Cheese  
Bacon Lettuce Tomato  
Soup du Jour

### Beverages

2% Fat Milk  
Skim Milk  
Chocolate Milk (2%)  
Coffee  
Tea  
Fruit flavored drink mix  
Carbonated Beverages

### Salad Bar

Cucumber Slices  
Marinated Cauliflower  
Assorted Relish Tray  
Flavored Gelatin  
Grated Cheeses  
Carrot Slices  
Celery sticks  
Lemon Wedges  
Hard Cooked Egg  
Chef Salad  
Green Pepper  
Sliced Tomatoes  
Sliced Onions  
Sliced Pickles  
Shredded Lettuce Leaves  
Beets  
Olives  
Tabasco Sauce  
Mayonnaise  
Mustard  
Catsup  
Worcestershire Sauce  
Saltine Crackers  
Jalepeno Peppers

FT LEWIS

12 November 1986 (Day 1)

Lunch

Roast Beef & Brown Gravy  
Baked Chicken & Chicken Gravy  
Chili con Carne  
Breaded Veal Patties  
Baked Beans  
Baked Macaroni & Cheese  
Mashed Potatoes  
Buttered Wax Beans  
Cauliflower  
Lettuce Salad  
Cottage Cheese & Tomato Salad  
Cucumber & Onion Salad  
White Cake/Choc Butter Cr Frosting  
Chocolate Chip Cookies

Dinner

Braised Spareribs  
Swiss Steak & Brown Gravy  
Breaded Veal & Brown Gravy  
Spanish Beef Patties  
Mashed Potatoes  
Noodles  
Buttered Peas  
Mixed Vegetables  
Lettuce Salad  
Cottage Cheese & Tomato Salad  
Cucumber & Onion Salad  
White Cake/Choc Butter Cr Frosting  
Chocolate Chip Cookies

13 November 1986 (Day 2)

Lunch

Barbecued Ribs  
Pork Schnitzel & Brown Gravy  
Mashed Potatoes  
Cottage Fried Potatoes  
Carrots  
Spinach  
Buttered Mixed Vegetables  
Wax & Green Beans  
Buttered Corn  
Lettuce Salad  
Cottage Cheese Salad  
Country Style Tomato Salad  
Gingerbread  
Chocolate Cream Pie  
Peach Pie  
Applesauce  
Vanilla Cookies  
Whipped Topping  
Applesauce

Dinner

Ginger Pot Roast  
Beef Pot Pie  
Barbecued Chicken  
Breaded Veal Steaks  
Mashed Potatoes  
Parsley Potatoes  
Buttered Succotash  
Mixed Vegetables  
Green Beans  
Lettuce Salad  
Cottage Cheese Salad  
Country Style Tomato Salad  
Chocolate Cream Pie  
Gingerbread  
Vanilla Cookies  
Peach Pie  
Applesauce



FT LEWIS

14 November 1986 (Day 3)

Lunch

Breaded Veal & Brown Gravy  
Beef Turnovers  
Baking Powder Biscuits  
Mashed Potatoes  
Oven Browned Potatoes  
Buttered Corn  
Green Beans  
Cauliflower  
Buttered Succotash  
Lettuce Salad  
Coleslaw  
Cottage Cheese & Pineapple Salad  
Devils Food Cake/Bu Cr Frosting  
Raisin Cookies  
Apple Pie

Dinner

Barbecued Pork Cubes  
Beef Turnovers  
Breaded Veal & Brown Gravy  
Oven Browned Potatoes  
Spanish Rice  
Buttered Wax Beans  
Steamed Green Beans  
Turnip Greens  
Lettuce Salad  
Cottage Cheese & Pineapple Salad  
Coleslaw  
Devils Food Cake/Bu Cr Frosting  
Peach Pie  
Raisin Cookies

17 November 1986 (Day 4)

Lunch

Spaghetti & Meat Sauce  
Turkey Nuggets  
Mashed Potatoes  
Brussels Sprouts  
Mashed Potatoes  
Buttered Carrots  
Corn  
Wax & Green Beans  
Brussel Sprouts  
Lettuce Salad  
Cottage Cheese Salad  
Carrot & Raisin Salad  
White Cake/Coconut Bu Cr Frosting  
Spice Cookies  
Blueberry Pie  
Spice Cookies  
Blueberry Pie

Dinner

Spaghetti & Meat Sauce  
Ham Steak  
Salisbury Steaks & Brown Gravy  
Pork Loin  
Breaded Veal & Brown Gravy  
Mashed Potatoes  
Parsley Potatoes  
Brussel Sprouts  
Buttered Carrots  
Wax & Green Beans  
Peas  
Lettuce Salad  
Cottage Cheese Salad  
Carrot & Raisin Salad  
White Cake/Coconut Bu Cr Frosting  
Blueberry Pie

FT LEWIS

18 November 1986 (Day 5)

Lunch

Chicken Cacciatore  
Swiss Steak/Brown Gravy  
Fried Chicken  
Breaded Veal  
Mashed Potatoes  
Oven-Glo Potatoes  
Cottage Fried Potatoes  
Peas & Carrots  
Buttered Mixed Vegetables  
Brussel Sprouts  
Lettuce Salad  
Cottage Cheese & Tomato Salad  
Apple, Celery & Raisin Salad  
Yellow Cake/Choc Bu Cr Frosting  
Apple Crisp  
Vanilla Pudding  
Whipped Topping  
Spice Cookies  
Blueberry Pie

Dinner

Yankee Pot Roast and Brown Gravy  
Creole Macaroni  
Chicken Cacciatore  
Mashed Potatoes  
Oven Glo Potatoes  
Steamed Rice  
Buttered Cauliflower  
Green Beans  
Mixed Vegetables  
Lettuce Salad  
Cottage Cheese & Tomato Salad  
Apple, Celery & Raisin Salad  
Yellow Cake/Choc Bu Frosting  
Spice Cookies  
Vanilla Pudding  
Whipped Topping  
Apple Crisp

19 November 1986 (Day 6)

Lunch

Roast Beef & Brown Gravy  
Lasagna  
Pot Roast  
Corned Beef  
Mashed Potatoes  
Fried Rice  
Buttered Carrots  
Peas  
Green Beans  
Corn  
Country Style Tomato Salad  
Cole Slaw  
White Cake/Lemon Bu Cr Frosting  
Yellow Cake/Choc Bu Cr Frosting  
Chocolate Chip Cookies

Dinner

Simmered Ham Hocks  
New England Boiled Dinner  
Pork Adobo  
Roast Beef & Brown Gravy  
Breaded Veal  
Mashed Potatoes  
Corn  
Buttered Turnip Greens  
Green and Wax Beans  
Lettuce Salad  
Country Style Tomato Salad  
Cole Slaw  
Yellow Cake/Choc Bu Cr Frosting  
White Cake/Lemon Bu Cr Frosting  
Chocolate Chip Cookies

FT LEWIS

20 November 1986 (Day 7)

Lunch

Tuna Noodle Casserole  
Ham Hocks  
Baking Powder Biscuits  
Fried Rice  
Buttered Mixed Vegetables  
Wax & Green Beans  
Lettuce Salad  
Cottage Cheese & Pineapple Salad  
Carrot & Raisin Salad  
Marble Cake/Choc Bu Cr Frosting  
Congo Bars  
Spice Cookies

Dinner

Spanish Beef Patties & Sauce  
Noodles Jefferson  
Oven-Glo Potatoes  
Buttered Peas & Carrots  
Lima Beans  
Lettuce Salad  
Cottage Cheese & Pineapple Salad  
Carrot & Raisin Salad  
Marble Cake/Choc Bu Cr Frosting  
White Cake/Butter Cr Frosting  
Spice Cookies

## APPENDIX C

To accurately document nutrition initiatives implemented in the NCO Academy Dining Facility during the time of the Garrison Dining Facility Nutrition Research Study, the Ft. Riley Food Advisor was requested to provide this information. A copy of the response received in reply to this request is provided at this appendix.



**DEPARTMENT OF THE ARMY**  
**HEADQUARTERS 1ST INFANTRY DIVISION (MECH) AND FORT RILEY**  
**FORT RILEY, KANSAS 66442-9000**

AFZN-DL

8 September 1986

**SUBJECT: Nutrition Initiatives**

Commander  
Military Nutrition Division  
ATTN: SGRD-UE-N  
Natick, MS 01760-5007

1. Per conversation between MAJ Carlson, USARIEM, and SGM Kelly, this Headquarters the NCO Academy has instituted the following nutrition initiatives:


- a. Serving fresh fruit at all meals.
- b. Serving 2 percent milk at all meals.
- c. Making available a nutritionally balanced 500 calorie menu for each meal served.
- d. Providing herbal seasoning on each dining room table as an alternative to salt.
- e. Placing calorie cards by each item served.
- f. Deleting butter from cooked vegetables.
- g. Serving margarine as an alternative to butter.
- h. Using unsaturated fats for frying.
- i. Reducing the salt by 25 percent in all recipes except pastry.
- j. Serving unsweetened drinks at lunch and dinner meals.
- k. Serving low calorie cottage cheese at lunch and dinner meals when available.
- l. Serving an alternative to fried food at each meal.
- m. Serving unpeeled French Fries.
- n. Steaming fresh and frozen vegetables whenever possible.
- o. Serving low calorie yogurt at each meal.

AFZM-DL

SUBJECT: Nutrition Initiatives

- p. Having a sugar substitute available for each meal.
  - q. Conducting periodic classes for cooks on their role in the Army's nutrition awareness program.
  - r. Displaying nutrition awareness posters in the dining facility.
2. If we can be of further assistance, please feel free to contact this office, SGM Kelly at AUTOVON 856-3133.

FOR THE COMMANDER:

*For*  LTC, TC  
WILBURN C. GRISWOLD  
LTC, TC  
Director of Logistics

## APPENDIX D

The Ft. Lewis Food Advisor was asked to provide information to document the nutrition initiatives implemented in the 80th Ordnance Battalion Dining Facility. A copy of the information received in response to this request is provided here.



DEPARTMENT OF THE ARMY  
HEADQUARTERS, 593D AREA SUPPORT GROUP  
FORT LEWIS, WASHINGTON 98433-8400

REPLY TO  
ATTENTION OF:

AFZM-GPS-F

18 November 1986


Subject: Nutrition Awareness Program in the 593d ASG.

SUMMARY

Since my arrival in the 593d ASG (June 1984) there was no type of Nutrition Program implemented. In November 1984, a nutrition program was implemented on Nutrition Awareness for Dining Facility Operations only. When COL Irby arrived in 1985, the program was reviewed again. After his review, he desired an indepth nutrition program whereas nutrition, weight control and physical fitness played integral parts into the program. This was a total revamping of the initial program and was finally implemented 1 Nov 1985 as the 593d ASG Reg 30-1.

The present program, which is now established, has received many laudatory comments from I corps FORSCOM and TSA as one of the most comprehensive nutrition programs implemented. The Group Food Service also requires that training classes be conducted weekly on nutrition education, sanitation and foodborne illness.

These classes must be filed in the DFAC for evaluation. Finally a nutritional inspection is performed once a quarter as required by the 593d and AR 30-1.

  
DANNY FOREMIRE  
CW2 USA  
Group Food Advisor



## APPENDIX E

### Demographic Questionnaire

Name \_\_\_\_\_

SSN \_\_\_\_\_

Subject Number \_\_\_\_\_

Sex    M    F

Age \_\_\_\_\_

Race \_\_\_\_\_

1-White

2-Black

3-Hispanic

4-Other \_\_\_\_\_

Length of Time in Military \_\_\_\_\_ years

Rank \_\_\_\_\_

MOS

Primary \_\_\_\_\_

Secondary \_\_\_\_\_

Duty \_\_\_\_\_

Marital Status

1-Single

2-Married

3-Separated

4-Divorced

5-Widow/Widower

Highest Level of Civilian Education Completed

1 Grade School    3 College, Undergraduate

2 High School    4 Graduate School    5 Other(Specify) \_\_\_\_\_

Do you smoke or chew tobacco?    Yes    No

Number of cigarettes smoked per day \_\_\_\_\_

Number of cigars smoked per day \_\_\_\_\_

Number of pipes smoked per day \_\_\_\_\_

Number of tobacco chews per day \_\_\_\_\_

How long have you been smoking/chewing? \_\_\_\_\_

## Demographic Questionnaire

During a typical week, which meals do you eat, regardless of where you eat them? (Please check meals you eat).

	M	T	W	TH	F	SAT	SUN
Breakfast							
Lunch							
Dinner							

During a typical week, which meals do you eat at a military dining facility? (Please check those eaten in a military dining facility).

	M	T	W	TH	F	SAT	SUN
Breakfast							
Lunch							
Dinner							

How often during the week do you eat snacks? \_\_\_\_\_ Times

Between breakfast & lunch \_\_\_\_\_ times

Between lunch & dinner \_\_\_\_\_ times

After dinner \_\_\_\_\_ times

Please indicate any dietary supplements you take regularly. Specify brand and amount.

Protein \_\_\_\_\_

Vitamins \_\_\_\_\_

Minerals \_\_\_\_\_

Other \_\_\_\_\_

Are you satisfied with your current weight? Yes No

Are you trying to lose weight? Yes No How Much?

Are you trying to gain weight? Yes No How Much?

Do you follow any special diet? Yes No

If yes, please specify type \_\_\_\_\_

Do you add salt to your food? Yes No

Do you use a herb shaker? Yes No

# APPENDIX F FOOD CONSUMPTION RECORD

## Breakfast Meal

NAME: \_\_\_\_\_  
SUBJECT #: \_\_\_\_\_  
DATE: \_\_\_\_\_

Data Collector: \_\_\_\_\_  
Data Enterer: \_\_\_\_\_

<u>Food Type</u>	<u>Description</u>	<u>Code #</u>	<u>Portion Served</u>	<u>Portion Returned</u>	<u>Reason not Finished</u>	<u>Added Salt</u>
Egg Entree	Fried Eggs	_____	_____	_____	_____	_____
	Hard Cooked	_____	_____	_____	_____	_____
	Asst Omelets	_____	_____	_____	_____	_____
	(Specify _____)	_____	_____	_____	_____	_____
Breakfast	Bkd Bacon Slices	_____	_____	_____	_____	_____
	Bkd Sausage Patties	_____	_____	_____	_____	_____
	Creamed Beef	_____	_____	_____	_____	_____
Starches	Hash Brown Potatoes	_____	_____	_____	_____	_____
	French Toast	_____	_____	_____	_____	_____
	Griddle Cakes	_____	_____	_____	_____	_____
	Grits	_____	_____	_____	_____	_____
	Dry Cereal	_____	_____	_____	_____	_____
	(Specify _____)	_____	_____	_____	_____	_____
	BP Biscuits	_____	_____	_____	_____	_____
	Toast	_____	_____	_____	_____	_____
	Pastry	_____	_____	_____	_____	_____
	(Specify _____)	_____	_____	_____	_____	_____
Fruit/Juice (Specify)	_____	_____	_____	_____	_____	_____
	_____	_____	_____	_____	_____	_____
Beverages	Whole Milk	_____	_____	_____	_____	_____
	2% Fat Milk	_____	_____	_____	_____	_____
	Chocolate Milk	_____	_____	_____	_____	_____
	Coffee	_____	_____	_____	_____	_____
	Tea	_____	_____	_____	_____	_____
Spreads and Condiments	Maple Syrup	_____	_____	_____	_____	_____
	Melted Butter	_____	_____	_____	_____	_____
	Butter	_____	_____	_____	_____	_____
	Margarine	_____	_____	_____	_____	_____
	Jam/Jelly	_____	_____	_____	_____	_____
	Creamer	_____	_____	_____	_____	_____
	Sugar	_____	_____	_____	_____	_____
	Salt	_____	_____	_____	_____	_____
	Pepper	_____	_____	_____	_____	_____
	Herb Shaker	_____	_____	_____	_____	_____
	Catsup	_____	_____	_____	_____	_____
	Hot Sauce	_____	_____	_____	_____	_____
Other	_____	_____	_____	_____	_____	_____
	_____	_____	_____	_____	_____	_____

# **APPENDIX F** **FOOD CONSUMPTION RECORD**

Lunch/Dinner

NAME: \_\_\_\_\_

Date: \_\_\_\_\_

SUBJECT #: \_\_\_\_\_

Data Collector: \_\_\_\_\_

MEAL: ☐ Lunch ☐ Dinner

Data Enterer: \_\_\_\_\_

<u>Food Type</u>	<u>Description</u>	<u>Code #</u>	<u>Portion Served</u>	<u>Portion Returned</u>	<u>Reason not Finished</u>	<u>Added Salt</u>
Entree	_____	_____	_____	_____	_____	_____
	_____	_____	_____	_____	_____	_____
	_____	_____	_____	_____	_____	_____
Starch	_____	_____	_____	_____	_____	_____
	_____	_____	_____	_____	_____	_____
	_____	_____	_____	_____	_____	_____
Vegetable	_____	_____	_____	_____	_____	_____
	_____	_____	_____	_____	_____	_____
Bread	Whole Wheat	_____	_____	_____	_____	_____
	White	_____	_____	_____	_____	_____
	Rye	_____	_____	_____	_____	_____
Sandwich	_____	_____	_____	_____	_____	_____
	_____	_____	_____	_____	_____	_____
	_____	_____	_____	_____	_____	_____
	_____	_____	_____	_____	_____	_____
Soup	_____	_____	_____	_____	_____	_____
Salad	Chef's	_____	_____	_____	_____	_____
Salad	_____	_____	_____	_____	_____	_____
	_____	_____	_____	_____	_____	_____
	_____	_____	_____	_____	_____	_____
	_____	_____	_____	_____	_____	_____
	_____	_____	_____	_____	_____	_____
	_____	_____	_____	_____	_____	_____
	_____	_____	_____	_____	_____	_____
Salad Dressing	_____	_____	_____	_____	_____	_____
	_____	_____	_____	_____	_____	_____
Dessert	_____	_____	_____	_____	_____	_____
	_____	_____	_____	_____	_____	_____

<u>Food Type</u>	<u>Description</u>	<u>Code #</u>	<u>Portion Served</u>	<u>Portion Returned</u>	<u>Reason not Finished</u>	<u>Added Salt</u>
Beverages	Whole Milk	_____	_____	_____	_____	_____
	2% Fat Milk	_____	_____	_____	_____	_____
	Skim Milk	_____	_____	_____	_____	_____
	Chocolate Milk	_____	_____	_____	_____	_____
	Coffee	_____	_____	_____	_____	_____
	Tea	_____	_____	_____	_____	_____
	Hot Chocolate	_____	_____	_____	_____	_____
	Koolaid	_____	_____	_____	_____	_____
	Diet Koolaid	_____	_____	_____	_____	_____
Soft Drinks	_____	_____	_____	_____	_____	_____
	_____	_____	_____	_____	_____	_____
Condiments	Butter	_____	_____	_____	_____	_____
	Margarine	_____	_____	_____	_____	_____
	Sugar	_____	_____	_____	_____	_____
	Sugar Substitute	_____	_____	_____	_____	_____
	Salt	_____	_____	_____	_____	_____
	Pepper	_____	_____	_____	_____	_____
	Herb Shaker	_____	_____	_____	_____	_____
	Hot Sauce	_____	_____	_____	_____	_____
	Creamer	_____	_____	_____	_____	_____
	Catsup	_____	_____	_____	_____	_____
	Mustard	_____	_____	_____	_____	_____
	Relish	_____	_____	_____	_____	_____
	Peanut Butter	_____	_____	_____	_____	_____
	Jelly _____	_____	_____	_____	_____	_____
Other	_____	_____	_____	_____	_____	_____
	_____	_____	_____	_____	_____	_____
	_____	_____	_____	_____	_____	_____

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